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ABOUT SHELLS.

BY CHARLES WRIGHT.

In the course of my herborizations in Cuba, I have had frequent occasion to climb trees for flowers which I could not otherwise obtain, and much more frequent occasion to clamber about the limestone cliffs which furnish a great variety of plants, many of which are common in such localities, and are found nowhere else. In these circumstances, it was hardly possible that my attention should not be drawn to the shells, some inhabiting trees, and many more the rocks. I came, in truth, to be very fond of them, spending many hours entirely devoted to shell hunting, which, I begin to think, I could have spent more profitably in my legitimate calling. I propose to relate some of my observations, and to give my views as to the causes of some of the phenomena observed, hoping that they who make this branch of the animal kingdom a special study, may be prompted to investigate these phenomena more minutely than I had time or ability to do.

Shells have a season of hibernation in hot climates as well as in cold; but, in the former, the cause of their inactivity is dryness; in the latter, low temperature. If the drought be protracted, the greater part seek a retreat where

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some degree of moisture prevails; for example, in the ground or among the dead leaves covering it; in a hollow tree or in the crevices of the bark; under stones or among the leaves of epiphitic Tillandsias. But occasionally an individual is found abroad at this season, and repeated examination led me to discover *a* reason for it; whether it is *the* reason, may remain for wiser ones to determine. These shells are commonly stuck fast where they are found, or glued as it were, and not merely adhering as in a time of rest in the wet season. And they have all been injured,—the shell more or less broken. Are they going to die? Are they undergoing repairs? This last seemed to me more probable. They *are* always, in part at least, grown together, not quite symmetrically often, but generally quite firmly. Do they eat by night as in the rainy season? This I cannot assert. The firmness of their attachment would indicate that they do not. So uniform has been my experience in this case, that now, if I see an Achatina, or a large Helicina, on a tree in the dry season, however inviting they may appear at a distance, I pass them by as worthless.

Oleacina and its allies are carnivorous snails. They have a smooth polished delicate shell, yet possess the power to capture and devour others many times larger than themselves, besides being protected by a firm shell, and with a closely fitting hard operculum. Not unfrequently we find large shells like *Helicina regina*, or *H. sagræana*, quietly submitting to be devoured by an Oleacina, which it has the strength to walk off with, as easily as a tortoise could carry away a mouse. Wherein lies their great strength? I can offer a suggestion. I have often been in such situations on the face of a vertical cliff, that I needed both hands for support. At such times, if a shell attracted my attention, I used to put it between my lips till I reached a place where both hands were free. Thus I learned, that the watery or slimy secretion which all these animals emit, in the case of this group, is bitter; and in the larger species, very deci-

dedly so. I can hardly doubt that the secret of the power which these snails possess is to be sought here. May not this bitterness produce a benumbing effect on their prey? I have discovered a like bitterness in no other shell, and I have collected many species in this way, using my mouth as a temporary box.

Proserpina has a shell of like delicate structure as that of Oleacina. Once I found one in close contact with a Melaniella. This, together with its structure, led me to suspect that it, too, is carnivorous. Who knows? Will an examination of the tongue tell? Will some one try it? I once amused myself capsizing these little fellows, and if they did not manifest real anger, there was a very good imitation of it. Turned on its back, it lashed its tail about violently for a snail; or I might say it behaved mulishly and kicked,— the organ thus forcibly used being called the foot, I believe. The inverted position seemed a painful or disagreeable one.

I hesitate to record an observation repeatedly made on account of the apparent improbability of the fact, and the difficulty of explaining it. Individuals of some species of shells many times vary greatly in size as well as in color. In other species, the said variations are slight. In one or more species of Cyclostoma of this latter kind, I have often found young individuals considerably larger than any fully grown. There could be no shadow of a doubt that these were all of the same species, and not two distinct ones living together. Among a dozen or two fully formed shells and others nearly grown, all agreeing well in size, one, perhaps two or more, incomplete individuals would occur, so much larger than all the rest, as to suggest the question, — *Why do we not find finished shells of this larger size?*

Two solutions of this question have presented themselves as possible, though neither of them is quite satisfactory. One is, that the animal has power to absorb its shell and reconstruct it of a smaller size. The other, which seems more probable, is, that these overgrown individuals are abnor-

mal, deformed, and never come to perfection. Thus, being thin and fragile, they soon crumble and disappear. I have thought that I found proof or evidence that mollusks *have* power to absorb and reform the shell. From Melania and Paludina, which are viviparous, I used to preserve the young found in the process of cleaning the shells. Observing that they were quite blunt at the apex, and that somehow in their growth toward maturity they became sharp-pointed, I could in no other way account for this than by supposing that they absorbed the shell, and reconstructed it after a smaller pattern. I will admit, for what it is worth, the possibility of inaccuracy in my observations when comparing small things with great. Thus, a very short cone might appear blunt, while, if increased tenfold, the bluntness would be, relatively, quite little. Yet this view does not satisfy me, and I still think my first impressions were correct. Will not some one by accurate measurements settle this question?

On the beach to the eastward of Matanzas the habits of a Cyclostoma struck me as noteworthy. A hundred yards or more from the shore, the ridge formed of sand and broken shells is overgrown with various trees and bushes, which this shell ascends probably to feed on some lichen. But if the tree leaned at any considerable angle, say twenty-five or thirty degrees, no shell could be found on it. And of the bushes, too, it had its choice as to size, also. None seemed to venture up a bush, or there was no attraction for them, if it were not larger than the finger or thumb. It may very well be, that on the small bushes they found nothing to eat; but the same reason cannot be given for their refusal to ascend larger leaning ones.

It has been said above, that in winter shells mostly lie dormant, not on account of the cold, but of the dryness. But if, at this season, a heavy shower occurs, which is not very unusual, they come out of their hiding places and appear to be feeding; not, indeed, in such numbers as during the summer, for already many are dead. Now, let a

norther, which is a drying wind, spring up, and they haste away to their retreats with all possible speed. Such a shower occurred on a winter night when I was in the neighborhood of Guane, where there are excellent rocks for shells, and many and various shells among the rocks. Early in the morning I found some specimens of *Melaniella Pichardi*. They were not abundant, though I saved a considerable number, and was desirous of collecting more of them, as it is, by no means, common. While I was at breakfast, a light norther began blowing. I made but little stay, and returned to the rocks, in hopes, though not confident, of finding more. Not one was to be seen, however. Similar effects are produced by a norther on other shells. Just at night I have observed *Cyclostoma salebrosum*, in numbers, on rocks, where, in the morning, if a norther prevailed during the night, not one could be found but by searching among the leaves at the base of the rocks. This shell, with some others, as *Cycl. rotundatum* and *Cycl. undatum*, have a way of letting go and rolling to the bottom of the rock if it be inclined (and they seem to prefer such), when they see the hand approaching; and this, apparently, when they have not even *one* eye open. It would seem as if they felt the approach of danger.

A group of Cyclostomas, *C. claudicans* Poey, *C. assimile* Gundl., *C. tenebrosum* Mor., and perhaps others, spin a thread by which they hang from the lower side of projecting rocks. When the weather clears after a rain, numbers may be found thus at rest, particularly in the early summer, when the young abound. Whether they can haul in their line I am unable to say, but guess they cannot; for many are found with the border broken, which could hardly be so common, unless caused by a fall from some height. If in this position they fall, it must sometimes be a distance of fifty, or, it may be hundreds of feet. These are all thin, delicate shells; and the power of suspension seems as if designed for their injury or destruction.

Helix stigmatica, and its allies, live under stones or among dead leaves. They are dull in color, and the most of them small in size. H. stigmatica is never found fairly in the daylight. Once only, if I rightly remember, I found an individual which had just turned the corner of the rock under which it lived. Why do they not come out to the light, and what do they live upon in their dark retreats? Another group, of similar habits, comprises *Helix Titanica*, *H. pulcherrima* and others. These have longitudinal lines of bristles, or rather stiff hairs, which are quite conspicuous in the young shell, but diminish, wear away, or quite disappear with age.

Shells often cease growing for a time, so far at least as relates to their calcareous covering. Their growth is interrupted during the dry season, and it may also be by an unusually dry time in summer. In banded shells, when the growth is resumed, the pattern of their markings is often, perhaps always, changed. The bands may be moved to the right or left, or be divided into two, or two may be united, or a color may be suppressed, or a new one introduced, or any one color may be widened or narrowed. In *Helix picta* Born., the variety of markings is almost innumerable. While the animal remained quiescent as a whole, why did not the several parts retain their relative positions? The color-secreting glands must have changed in position.

The wide diffusion of some species, and the extremely limited area in which others are found, excite in the inquiring mind a desire to know the causes of this unequal distribution. *Helix regina* in several forms is found in the whole of the mountain range of the western part of the island. *Helicina adspersa* is another extensively diffused species, besides being very variable in size and markings. On the other hand, *Cyclostoma foveatum* has been found only in one locality, at the base of a high projecting cliff, in considerable numbers, but all dead; nor is it known where it lives. I have looked upwards from below, and have climbed to the top and looked downwards in vain. Not more than two or

three have been obtained in a moribund state,—a single one only with sufficient life to enable Gundlach to describe and figure the animal. A few square yards contain all we know of this species. *Achatina fasciata* is found from one end of the island to the other, and at all elevations above the sea, under several forms which have been described as distinct species. *Helix picta* Born. is another widely diffused shell, and extremely variable in color and size. I have observed many young in the top branches of a high tree just felled, on the very top of the mountains, in Yateras. It seems to be a high climber, which may account for its comparative rarity, fully grown and alive. I have met with very few.

Cylindrella is largely represented in Cuba, more than eighty species being enumerated in the latest catalogue. Most of the species are extremely local; several, so far as is now known, being restricted to localities of a few yards square, or to a few rods. Doubless other localities will be discovered for many of them. A few, as *C. Poeyana*, *C. elegans* and *C. irrorata*, are much more widely spread, but probably not one extends through the whole island as does *Achatina fasciata*. But what is most noteworthy is the remarkable tenacity of life possessed by many species. Some have lived for months, and even years; and, unless closely confined, they will crawl forth on the return of warm, damp spells of weather, getting into the wrong boxes and creating sad confusion.

THE SMALLER FUNGI.

BY JOHN L. RUSSELL.

[Concluded from page 570.]

ANOTHER point of interest worthy the attention of the observer, and furnishing subject matter for the microscope, is a sort of dimorphism,* and even something like alternate generations such as is observed in the lower animals. We

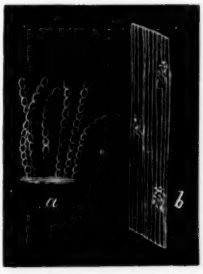
* *Dimorphism*, two shapes or forms.

have seen that the spermogones which accompany the cluster-cups in the *Æcidium*, for instance, seem to have some intimate relation to them. There is another kind of the smaller fungi which, attacking grain, is known as *Rust*, and in science is called *Uredo*. But besides the *U. rubigo*, or Rust, on the grasses and grain, Dr. Curtis enumerates twenty-eight other species which attack other plants, and which have come under his observation. In other sections of the United States other species are found, and on the cultivated roses of the gardens, an European species, the *Uredo rosæ*, has fallen under my notice. Of this particular kind of Rust, our author says, "in the Uredines as well as other of the Coniomycetes (in which the spores are the principal features), the same fungus appears under two or more distinct forms, not necessarily mere differences of age, but so distinct that they have been regarded (and some are so still) as different species belonging to different genera, often far removed from each other, and bearing different names. One plant (fungus), for instance, sprinkled over the under surface of a rose-leaf, like tumeric powder, has its mycelium, or root-like threads, penetrating the tissue, whilst bearing above its spherical golden colored spores. Its vegetative system is complete, and apparently its reproductive also; hence it seems to claim recognition as a perfect plant, and under the name of *Uredo rosæ* was so recognized, until microscopical investigation determined otherwise. Thus, it has been discovered that certain dark brown spots which appear later in the season, are produced upon the same mycelium, and are indeed, aggregations of more perfect and complex fruits of the same plant. Before this point was satisfactorily decided, the brown spores, which are borne on long stalks and are themselves septate, or divided by transverse partitions into a complex fruit, received the name of *Puccinia rosæ*. At this period *Uredo rosæ* and *Puccinia rosæ*, or the yellow fungus and the dark brown fungus, were believed to be distinct and different plants; now, on the contrary, they are believed to

be different forms of fruit produced by the same plant, *i. e.*, an instance of dimorphism."

A similar instance of this two-formed condition of the smaller fungi can be traced in the delicate mouldiness which covers the leaves of many plants, as the lilac, the grape, and the fruit of the gooseberry, and looks like strings of beads made of colorless cells, in this condition known or described as *Oidium* (Fig. 1; *a*, tuft of conidia of *O. monilioides* × 120; *b*, portion of grass-leaf with the same species of blight. From Cooke), the spores being the self-same beads, and egg-shaped or oviform, whence the generic name; but careful observation will persuade us that this is not the perfect condition; and when later in autumn these threads become more compact, and are surmounted on their horizontal surfaces by shining black capsules, or perithecia, each of which is filled with elegant elliptical and elongated cells, and each in turn containing several spores, shall we find in *Erisyphe* that we have arrived at the conclusion of the dimorphism of this fungus, a parasite and injurious in its effects. The famous grape mildew, so destructive to the foliage of the wine and table grapes of Europe, and known as *Oidium Tuckeri*, is thus only an imperfect form of some common *Erisyphe*, or mildew; and in this portion of Massachusetts, so far as I have observed, it is the *Uncinula spiralis* (B. and C.) which attacked the foliage of the sweet water grapes, as on vines of Mr. E. S. Rogers of Salem, in 1850, and the same parasitic fungus which covered the leaves of the wild grape, Isabella, and other hardy varieties, and which can be detected every season to a greater or less extent.

Fig. 1.



And besides this dimorphism thus apparent in the smaller fungi, stranger facts connected with their natural history meet us here. Observation has detected in the Æcidium, or cluster-cups, not a perfect fungus as it would seem, but in

them only a condition of some other fungus! Thus the genus *Uromyces* contains several distinct kinds of minute fungi, of which, for example, we will select the bean-leaf rust (*U. appendiculata*), which consists of brown dusty spots, resulting from clusters of spores not enclosed in any pustule, excrescence or peridium. Each of these spores will be found to be furnished with a tiny footstalk, and by means of which they are attached to the living leaf of the bean. The spore itself is unilocular, oboval in shape, terminated by a rounded point, having two distinct coverings, the outer of a deep brown color and smooth, the inner colorless; these enclose a granular matter surrounding a vacant and rounded spot, and having at the top a minute opening. These spores are ripe towards the end of summer, and in harvesting the crop, the brown and snuff-like powder will readily part from the dead foliage, and from the pods, and smut the fingers. Like the seeds of the higher plants they await the return of spring, when, if having fallen upon humid soil, "the spore emits a curved and obtuse tube, which, soon ceasing to elongate itself, gives origin to three or four sporidia, of a kidney shape." If the sporidia should fall upon a living bean-plant, the tube "on being emitted penetrates the wall of any approximate cellule, swells and increases into a cylindrical tube equal in thickness to the original sporidia, and therefore four or five times the diameter of the germ-tube before it entered the cellule. The contents of the sporidia and external portion of the tube pass into the portion within the cellule, and then these external portions perish, and all evidence of the entry is obliterated, except a very minute point at which the tube remains attached to the inner surface of the wall of the cellule. The enclosed tube soon elongates, divides, and becomes branched. These branches pass into the spaces of the pulp of the leaf and become mycelium, a change which takes place in a few hours. Where the sporidia had fallen on the surface of the bean-leaf, little white spots soon appear, and presently little

orange protuberances, many of them surmounted by a little drop of mucilaginous fluid. These are *spermogones*, daily increasing in number, and soon after numerous large globular protuberances intermingle with them. These soon rupture the skin of the leaf, and take the orange color and the form of cluster-cups, *Æcidium*. At length the summit of the peridia opens to allow the escape of the stylospores.*

It is easy to assure oneself that the spermogones and the cluster-cups proceed from the same mycelium, and for some time to come the peridia of the *Æcidium* continue to increase, till at length brownish or blackish points make their appearance, intermingled with the cluster-cups, increasing rapidly in number and magnitude. Examined by the microscope they present the ordinary fructification of *Uromyces* mingled with stylospores. Thus the mycelium of the cluster-cups engenders, at the end of its vegetation, fruits equal in all points to those from whence, in the first instance, they are derived. These stylospores found in the cluster-cups possess the irregular globular form and structure of their congeners. If they should be sown on the moistened epidermis (skin or cuticle) of a favorable plant, the sprouting or germ-tube at first creeps along the surface, but as soon as its extremities find a stomate,† it enters it, and elongates itself in the air-cavity‡ below the orifice, receives the contents of the original stylospore and exposed portion of its tube, then separates itself from those parts which become dispersed. The active part increases and ramifies, and produces a mycelium which spreads through the intercellular passages of the parenchyma (pulp). Whitish spots subsequently appear on the surface of the fostering plant, and indicate that the fructification of the parasite is about to commence. The epidermis is elevated and broken, and little brown pustules appear through the openings. These are the stylo-

**Stylospores*, a second kind of spores borne on long threads, enclosed in a peridium or appropriate pustule.

†*Stomate*, breathing-pore of the leaf. ‡Air-cavity, a space in the pulp of the leaf.

spores of *Uredo*, which are produced in immense quantities, and soon cover the pustules with a deep brown dust. Later, the formation of the stylospores is arrested, and the true germinating spores appear in the same pustules.

The stylospores of *Uredo* are borne singly at the top of short filaments. On arriving at maturity they detach themselves. They are of a globular form, with a reddish brown epispore (covering), provided with little pointed prominences, and three pores at equal distances. After maturity they germinate in precisely the same manner as the stylospores of the cluster-cups. They enter only through the stomata of the epidermis (skin of the leaf). The pulvinules (clusters of powdery spores) are identical with those which the stylospores of *Æcidium* originate, and they also produce true spores at the end of their vegetation. No other fruit arises from them. These organs, therefore, always reproduce the same form to which they owe their origin.

The result of these investigations shows that the Bean Rust (*Uromyces appendiculata*), besides spermogones, possess four sorts of reproductive organs, which all serve to propagate the species, but that one alone of them produces it in a form always identical, while the others present well marked *alternations of generations*. Hence it is concluded that there are, first, *Spores*, which produce the germinating promycelium;* second, *Sporidia*,—these give place to a mycelium, which bears afterwards; third, *Æcidium* (a condition which exhibits),—particular organs which engender stylospores, and which produce, fourth, the *Uredo*, or a second form of the stylospores and later spores (No. 1), which are always associated with Uredo in the same pustule. The spores and stylospores of *Uredo* come also upon the old mycelium, which had previously produced *Æcidium*. The Uredo stylospores always produce *Uredo* and true spores."

I have thus, with slight alterations, followed the author at some length in the details of this singularly interesting series

*Promycelium, the initiatory growth of the mycelium.

of facts, respecting what have been considered as three or more genera of the smaller and parasitical fungi. The account is in effect the epitome of De Bary's experiments, as given in the "Annales des Sciences Naturelles, Series 4, Vol. 20." Starting from *Uromyces*, we successively arrive at *Æcidium* or cluster-cups, and *Uredo* or Rust which, though found in some one of these stages on particular living plants, in reality belong to the development of one and the same parasite. Should any doubt arise as to the validity of these conclusions, the microscope and the too common occurrence of the several kinds or conditions afford facility for question and investigation. A study of similar stages of development by my friend Henry F. King, long ago interested me in the subject, and I here would bear grateful and willing testimony to his patience and skill in microscopical studies pertaining to the structure of the vegetable kingdom, and of its lower orders in particular.

Fig. 2.

The couch grass, or twitch grass (*Triticum repens*), is a well known weed, and though recommended for its nutritive qualities, is seldom cultivated unless in very light and dry soils. But with a pertinacity worthy a better fate, it springs up spontaneously in neglected spots, and can be found almost anywhere. Whoever is familiar with it, must have noticed that its broad leaves and stout stalks are frequently variegated and discolored by linear marks of a dusky hue, which on nearer inspection prove to be veritable cracks of the skin, from which protrude clusters of minute dusty particles. This diseased state is owing to a parasitic fungus, the *Puccinia graminis*, or the Rust, which sometimes does incalculable injury to grain crops. Many other plants are infested with the Puccinia Rust (Fig. 2; *a*, wheat-straw attacked by mildew, *Puccinia graminis; b*, cluster of spores of corn

mildew, magnified; *c*, single spore of corn mildew, *Puccinia graminis*, magnified 300 diameters. From Cooke), but as this is so common, let it serve as an example of the whole. If bent on investigating this rust, you will seek it in its first stage, in the form of yellowish elongated pustules, when it constitutes the *Trichobasis rubigovera* of the French botanist Léveillé, and distinguished by one-celled yellow spores, with thickened outer coverings, and supported on short peduncles, which shortly fall away. Later in the season, brown pustules may be observed on the leaves and stems of the same grass plant, and in these, when ripened, the spores are black, club-shaped, slightly constructed, and transversely divided by a septum, the peduncle or footstalk being distinct and permanent. Common as this pretty fungus is, it will repay attention in its microscopical study. In England by a strange confusion, such indeed as exists elsewhere among the unlearned, the first condition of this smaller fungus is termed the Rust, while the second is called *Mildew*. Allowing this latter name as applied to the Puccinia, "there is no doubt that the mildew is very injurious to the corn (grain) crop. Different opinions may exist as to how the plants become inoculated, or how the infection may be prevented or cured.—We are not aware that this question has been satisfactorily determined. It is worthy of remembrance by all persons interested in the growth of corn (grain), that the mildew is most common upon plants growing on the site of an old dunghill, or on very rich soil. As the same *Puccinia* is also to be found on numerous grasses, no prudent farmer will permit these to luxuriate around the borders of his fields, lest they should serve to introduce or increase the pest he so much dreads." (pp. 54, 55.)

I once had brought to me some stems of barley, so much infested with this little parasite, that the entire crop of straw anticipated was most materially injured. In some seasons scarcely any of the firmer and coarser leaved grasses escape its visits. Search for other species of this singularly

interesting small parasitic fungus would direct attention to the beauty and variety of the spores; and the leaves of some plants favorable to the growth of certain kinds become so seriously diseased that they appear scorched and burned; to such the old Anglo Saxon word, meaning *to burn*, long ago applied, still adheres in the corn "brands," mint brand, dandelion brand, etc., indicating a still minuter shade of difference where some are "elongated and tapering at each end, some crowned with spicular processes at the top, some echinulate* over the entire surface, and globose, elliptic, nearly parted in two, or others so variable in the same species "that no two are alike,"—any compound microscope of ordinarily good power, with a quarter inch objective, revealing these wonders and delighting the eye. Other beautiful species belonging to other genera of these smaller fungi await indeed the mycological student, and who could not be induced to botanize in such a field of wonders where "complex brands" likewise invite his finding; as in *Triphragmium* with its dark brown, echinulate, three-celled spores; in *Aregma* on the rose leaves with many-celled and cylindrical spores, also echinulate; in *Xenodochnus* with its many-parted, bead-shaped and distinctly articulated black spores; in *Ravenelia* with its acorn-shaped spores—some known to American botanists, others awaiting the fortunate discoverer. And precious as are the carefully dried and hoarded leaves which autumn has painted with matchless colors, how much more valued are they and others, if the receptacles of such microscopical treasures in the Rusts and Brands.

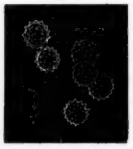
"One of the fungal diseases, long and widely known, has obtained among agriculturists different appellations in different localities. In some it is the *smut*, in others it is, respectively, *dust-brand*, *bunt-ear*, *black-ball*, and *chimney-sweeper*, all referring, more or less, to the blackish, sootlike dust with which the infected and abortive ears are covered. This fungus does not generally excite so much concern amongst

Echinulate, covered with small spines.

farmers as the other affections to which their corn crops are liable. Perhaps it is not really so extensively injurious, although it entirely destroys every ear of corn upon which it establishes itself."

In England and in Europe the "smut" here alluded to, is the *Ustilago segetum*, attacking the heads of wheat and other grain. It is also known in this country, but the one most familiar to us and readily observed on account of the size of the part of the plant it attacks, is the smut of Indian corn or maize, *U. Zeæ* (Fig. 3, spores of *Ustilago maydis*, the maize smut, magnified 400 diameters. From Cooke). The spores in this fungus are exceedingly numerous, "simple, deeply-seated, springing from delicate threads or in closely packed cells, ultimately breaking up into a powdery mass." Like the aforementioned parasites of Coniomycetes, the smut or *Ustilago* has numerous destructive forms which attack various portions of different living plants. Another European species also occurring in the United States according to Dr. Curtis, is the *U. hypodites*, of which we learn from a lecture delivered in the city of Norwich, England, in 1849, and to be found in the Report of the Commissioner of Patents, Executive Document, No. 15, Thirty-first Congress, 1849, that "its spores are black, round, and very small; that there was a great deal of it in 1848, in a field near King's Cliffe, almost every flower stem of the *Bromus sylvatica* being infected by it, and in addition to the ruin of the grass it was most pernicious. According to Lévellé the immense quantity of black dust resulting from it in the hay-fields in France, produces disastrous consequences on the haymakers, such as violent pains and swellings in the head and face, with great irritation over the entire system."

Fig. 3.

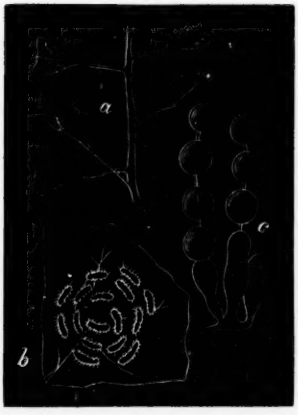


Like the "brands," the "smuts," too, have kinds with complex spores, of which one called *Polycystis*, or many-cysted smut, attacks the stems of violets, the leaves of but-

tercups, and similar plants. Although noticed abroad, as we learn from our author, the name does not occur in Dr. Curtis' list, nor the *Tubercinia*, whose bullate and blistered peridia attacks the European Trientalis, or star-flower, and may therefore reasonably be sought for by us in our northern New England co-species. The only approach to these complex smuts is in the *Thecaphora*, which differs from the maize smut, in its spores being made up of three or many irregularly hexagonal parts, each echinate and beautiful microscopic objects, which I think I once received from my friend Charles J. Sprague, Esq., who is so celebrated for his mycological knowledge of the fungi of Massachusetts.

The usual idea we have of rust and rustiness is something similar to the rust of iron, and a rusty color is one of a yellowish brown hue. But the word is used in a wider sense when employed to denote a parasitic fungal, and we accordingly are informed of "White Rust" in another of the smaller fungi, which, from its too intimate connection with agricultural crops, is worth some attention. Thus the white rust of the cabbage, turnip, and similar plants, is owing to the presence of the *Cystopus candidus* (Fig. 4; *a*, fruit of shepherd's-purse with white rust, *C. candidus; b*, portion of cabbage leaf with the same species; *c*, conidia of the same species. From Cooke), which appears in circular patches of white spots, and causes the leaves to become deformed, swollen and blistered, even before we can trace the cause of the mischief on the outside. These blistered pustules have a minute system of branching threads, which traverse the pulpy parts of the leaves, and which threads,

Fig. 4.



insinuating themselves between the cells that constitute the pulp, derive their nutriment at the expense of the growing foliage. It is after the pustules assume the white color, and are visible on the skin or cuticle, that the reproductive parts termed *conidia*, can be detected. Indeed the whole interior of the white pustules is made up of bundles of club-shaped tubes, which have been extended from the system of threads, and which tubes give off bead-like strings of cells, each bead by turns parting from the chain or necklace, and escaping into the air through the distended and ruptured pustule. From the multitude of these beads or spores, forming a white powdery dust, the term "conidia" is applied, which means dust-like. Other plants beside are similarly affected, and the water-cress, pepper-grass, mustard, radish, shepherd's-purse, and even the purslane, fall victims to its ravages. That so hardy a weed as the shepherd's-purse (*Capsella bursa pastoris*) should become pallid and sick, indicates the nature of the drain which is made on its juices by this parasite, and it is not improbable that the "clubbing" of the cabbage, where the stalk becomes gouty and swollen, and refuses to make a healthy growth, may be owing to similar exciting causes in the presence of the mycelium of some fungus in its tissues. From the researches of M. Provost, in 1807, we learn that the germination of the conidia, or spores, is one of the most curious phenomena of plant life, and indicates in this low order of vegetation, a relation to higher structural forms, not only in plants but even in animals. Thus, if a few particles of the white dust is thoroughly immersed in a drop of water, and examined under the microscope, "they will rapidly absorb the water and swell; soon afterwards a large and obtuse papilla, resembling the neck of a bottle, is produced at one end of the extremities. At first vacuoles* are formed in the contents of each conidium (spore). As these disappear, the whole granular substance filling the conidium becomes separated

**Vacuole*, a little vacuum, or seeming empty space.

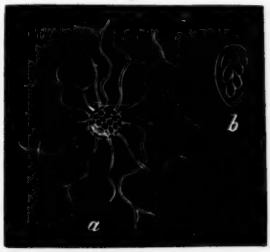
by very fine lines of demarcation, into five to eight polyhedric portions, each with a faintly colored vacuole in the centre. These portions are so many *zoöspores*. These are soon expelled one by one, afterwards begin to move, the zoöspores themselves provided with vibratile ciliæ swim away, each a seeming animalcule, but in reality only a sort of bud endowed with motion, and such as exist in some other plants. The particular office of the zoöspore, whether issuing from a conidium, or from some other process in the growth of the parasitical fungus, is to serve as a medium to the impregnation of the plant, be it weed or valuable farm vegetable; and curious to say it has been proved that the entrance into the pulp tissue of the same vegetable, is neither through the roots nor by absorption of the leaves, but invariably through the seed-leaves, first leaves or *cotyledons*, as they are scientifically termed. The prodigal provision of Nature is here, as everywhere, especially in its lower organizations signally manifested, when we are told that "the immense number of zoöspores capable of being produced from a single infested plant is almost beyond calculation. It is easy for a million of conidia to be developed from such a plant, each producing from five to eight zoöspores, besides a large number of other organs each containing a hundred zoöspores. It can scarcely be considered marvellous that the white rust should be so common on plants favorable to its development, the marvel being rather than that any plant should escape." (p. 136.)

Quite a distinct family of the smaller fungi, and far more injurious in many instances, is termed *Hyphomycetes*, *i. e.*, fungi whose growth consists in throwing out delicate threads. In this family there are several distinct but natural groups, and with one of these groups called the *Mucedines*, we have something to do. The little fungi here specified are the true *Moulds*, and very naughty effects they produce, as we shall learn on a better acquaintance than the usually superficial one, which is confined to mouldy bread and cheese and other

viands, and which are so bright and vivid in color that they at once attract the attention, the most alarming and insidious requiring the higher powers of the microscope, and under their almost invisibility working signal destruction. Like the coniomycetes, or dust-fungi, which we have noticed, the hyphomycetes or thread-fungi, and the mucedines or true moulds, which are included, are provided with a vegetative system of branching threads, called the mycelium, but unlike the former, these have fertile or spore-bearing threads which are perfectly distinct. These latter kinds are "sometimes simple and sometimes branched; they may be articulated or without articulations; short or long, erect or creeping; transparent or whitish, mostly free from color, and are not coated with a distinct membrane. The spores are generally simple, sometimes solitary, at others in pairs or strung together like beads for a necklace. Amongst all this variety of arrangement there is order, for these are but features, or partly the features of the different genera of which the *Mucedines* are composed. One of the genera is termed *Peronospora*, known by its having for the most part inarticulate or jointless threads and two kinds of spores, one kind on the tips of the branches, the other, larger and globose, on the creeping mycelium or spawn. The diseases of many of the most valuable farm crops, are in Europe and England attributed to the several species of the Peronospora, and are called the dock, lettuce, onion, parsnip, potato, rose, spinach, and tare or vetch moulds; each so specifically distinct as to be recognized on whatever plant may foster it, and destructive and dangerous. Whether the same kinds, or indeed whether the peronospora injuriously affects the same vegetables in this country, observation and research at present only can decide. Its effects in the potato disease are considered in a paper in a previous issue of the NATURALIST. I only know that I have met with a similar mould on decaying Agarics, strongly resembling Caspary's figures, and to which allusion has before been made. In like manner the "white mildews

or blights" are due to sundry other hyphomycetes or thread-like smaller fungi, which, equally abroad and in this country seriously affect the leaves and fruits, and seed-vessels of various living plants. Of these mention has been made of the *Erysiphe* when noticing the dimorphism of certain fungi, and the list of plants to which the several species of this injurious little fungal growth and of its allies attaches itself, would be perhaps about the same at home or abroad. Any one who has had to do with the greenhouse kept at a low temperature, with the plant propagating house, or with the culture of the parlor plants, must be familiar with the rose-leaf mildew, especially when it so suddenly attacks the finer and tender sorts of the tea roses; and will recognize in the following description this insidious pest: "The first species in our enumeration is found on cultivated roses. What a deplorable picture does a favorite rose-bush present when attacked by this mildew! The leaves blistered, puckered and contorted; their petioles and the peduncles and calyces of the flowers swollen, distorted, and gray with mould, and the whole plant looking so diseased and leprous that it needs no mycologist to tell that the rose is mildewed. This species is the *Sphærotheca pannosa* of Léveillé." (pp. 165, 166.) The hop mildew abroad is an allied species, the hazel, oak and beech mildew attacks the alder leaves here in *Phyllactinia guttata;* the English willow blight is here found "common on living leaves" (Curtis); the foreign barberry mildew, *Microsphœria*, is here under several species; the common white mildew, *Erisyphe communis* (Fig. 5; *a*, conceptacle of buttercup blight × 80, *E. communis; b*, sporangium of the same, highly magnified. From Cooke), is so "common" that it well deserves the name; the singular bristle mould, *Chœtomium chartarum*, attacks wet paper here as well as

Fig. 5.



abroad. Another bristle mould is found on rotting grass; the *Eurotium herbariorum*, pesters our botanists by its presence in their collections of dried plants, and so wide is the geographical range of many kinds of smaller fungi, that no country and scarcely any latitude escapes their visitations.

The exquisite elegance of the spores of the fungi should suggest the dry and wet mounting of them in glass slides for the microscope. Entire plants and portions of others could be readily prepared, and the patience, enthusiasm, and skill of a Bicknell are all that are requisite for a beginning in this direction.

It is with extreme reluctance that we lay down this fascinating little treatise; its pages indeed may be read and reread with constant profit. To this and to similar works, the botanist, the general enquirer, and the agriculturist are equally indebted, and well will it be for this country when the American press shall issue many and such as this.

A CHAPTER ON FLIES.

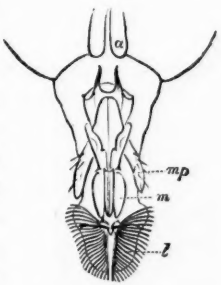
BY A. S. PACKARD, JR.

[Concluded from page 596.]

THE common House-fly, *Musca domestica* Linn., scarcely needs an introduction to any one of our readers, and its countenance is so well known to all that we need not present a portrait here. But a study of the proboscis of the fly reveals a wonderful adaptability of the mouth-parts of this insect to their uses. We have already noticed the most perfect condition of these parts as seen in the horse-fly. In the proboscis of the house-fly the hard parts are obsolete, and instead we have a fleshy tongue-like organ (Fig. 1), bent up underneath the head when at rest. The maxillæ are minute, and their palpi (*mp*) are single-jointed, and the mandibles

(*m*) are comparatively useless, being very short and small, compared with the lancet-like jaws of the mosquito or horse-fly. But the structure of the tongue itself (labium, *l*) is most curious. When the fly settles upon a lump of sugar or other sweet object, it unbends its tongue, extends it, and the broad knob-like end divides into two broad, flat, muscular leaves (*l*), which thus present a sucker-like surface, with which the fly laps up liquid sweets. These two leaves are supported upon a framework of tracheal tubes, which act as a set of springs to open and shut the muscular leaves. This framework of tracheæ does not seem to have been noticed in the books at hand while writing, Mr. Edward Bicknell having first called my attention to it. He has mounted specimens, previously treated with potash, for the microscope, in his unequalled style, which illustrate admirably the structure of the end of the proboscis. In the cut given above, Mr. Emerton has faithfully represented these modified tracheæ, which end in hairs projecting externally. Thus the inside of this broad fleshy expansion is rough like a rasp, and as Newport states, "is easily employed by the insect in scraping or tearing delicate surfaces. It is by means of this curious structure that the busy house-fly occasions much mischief to the covers of our books, by scraping off the albuminous polish, and leaving tracings of its depredations in the soiled and spotted appearance which it occasions on them. It is by means of these also that it teases us in the heat of summer, when it alights on the hand or face to sip the perspiration as it exudes from, and is condensed upon, the skin."

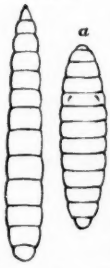
Fig. 1.



Every one notices that house-flies are most abundant around barns in August and September, and it is in the ordure of stables that the early stages of this insect are

passed. No one has traced the transformations of this fly in this country, but we copy from Bouché's work on the transformations of insects, the rather rude figures of the larva (Fig. 2), and puparium (*a*) of the *Musca domestica* of Europe, which is supposed to be our species. Bouché states that the larva is cylindrical, rounded posteriorly, smooth and shining, fleshy, and yellowish white, and is four lines long. The puparium is dark reddish brown, and three lines in length. It remains in the pupa state from eight to fourteen days. In Europe it is preyed upon by minute ichneumon flies (*Chalcids*). The flesh-fly, *Musca Cæsar*, or the Bluebottle-fly, feeds upon decaying animal matter. Its larva (Pl. 13, fig. 6) is long cylindrical, the head being pointed, and the body conical, the posterior end being squarely docked. The larva of an allied form which feeds on offal, etc., transforms into a flattened puparium (Pl. 13, fig. 5), provided with long scattered hairs. The House-fly disappears in autumn, at the approach of cold weather, though a few individuals pass through the winter, hibernating in houses, and when the rooms are heated may often be seen flying on the windows. Other species fly early in March, on warm days, having hibernated under leaves, and the bark of trees, moss, etc. An allied species, the *M. vomitoria*, is the Meat-fly. Closely allied are the parasitic species of Tachina, which live within the bodies of caterpillars and other insects, and are among the most beneficial of insects, as they prey on thousands of injurious caterpillars. Another fly of this Muscid group, the *Idia Bigoti*, according to Coquerel and Mondiere, produces in the natives of Senegal, hard, red, fluctuating tumors, in which the larva resides.

Fig. 2.



Many of the smaller Muscids mine leaves, running galleries within the leaf, or burrow in seeds or under the bark of plants. We have often noticed blister-like swellings on the bark of the willow, which are occasioned by a cylindrical

short fleshy larva (Pl. 13, fig. 3 *a*, much enlarged), about .12 of an inch in length, which changes to a pupa within the old larval skin, assuming the form here represented (Pl. 13, fig. 3 *b*), and about the last of June changes to a small black fly (Pl. 13, fig. 3), which Baron Osten Sacken refers doubtfully to the genus *Lonchæa*.

The Apple-midge frequently does great mischief to apples after they are gathered. Mr. F. G. Sanborn states that nine tenths of the apple crop in Wrentham, Mass., was destroyed by a fly supposed to be the *Molobrus mali*, or Apple-midge, described by Dr. Fitch. "The eggs were supposed to have been laid in fresh apples, in the holes made by the Coddling-moth (*Carpocapsa pomonella*), whence the larvæ penetrated into all parts of the apple, working small cylindrical burrows about one-sixteenth of an inch in diameter." Mr. W. C. Fish has also sent me, from Sandwich, Mass., specimens of another kind of apple worm, which he writes me has been very common this year in Barnstable county. "It attacks mostly the earlier varieties, seeming to have a particular fondness for the old fashioned Summer, or High-top Sweet. The larvæ (Pl. 13, fig. 2 *a*) enter the apple usually where it has been bored by the Apple-worm (*Carpocapsa*), not uncommonly through the crescent-like puncture of the curculio, and sometimes through the calyx, when it has not been troubled by other insects. Many of them arrive at maturity in August, and the fly soon appears, and successive generations of the maggots follow until cold weather. I have frequently found the pupæ in the bottom of barrels in a cellar in the winter, and the flies appear in the spring. In the early apples, the larvæ work about in every direction. If there are several in an apple, they make it unfit for use. Apples that appear perfectly sound when taken from the tree, will sometimes, if kept, be all alive with them in a few weeks." Baron Osten Sacken informs me that it is a *Drosophila*, "the species of which live in putrescent vegetable matter, especially fruits."

An allied fly is the parent of the cheese maggot. The fly itself, *Piophila casei* (Pl. 13, fig. 1), is black, with metallic green reflections, and the legs are dark and paler at the knee-joints, the middle and hind pair of tarsi being dark honey yellow. The Wine-fly is also a Piophila, and lives the life of a perpetual toper in old wine casks, and partially emptied beer, cider, and wine bottles, where, with its puparium (Pl. 13, fig. 4), it may be found floating dead in its favorite beverage.

We now come to the more degraded forms of Diptera which live parasitically on various animals. We figure, from a specimen in the Museum of the Peabody Academy, the Bird-tick, *Ornithomyia* (Pl. 13, fig. 7), which lives upon the Great Horned Owl. Its body is much flattened, adapted for its life under the feathers, where it gorges itself with the blood of its host.

In the wingless Sheep-tick, *Melophagus ovinus* (Pl. 13, fig. 10, with the puparium on the left), the body is wingless and very hairy, and the proboscis is very long. The young are developed within the body of the parent, until they attain the pupa state, when she deposits the puparium, which is nearly half as large as her abdomen. Other genera are parasitic on bats, among them are the singular spider-like Bat-tick, *Nycteribia* (Pl. 13, fig. 11), which have small bodies and enormous legs, and are either blind, or provided with four simple eyes. They are of small size, being only a line or two in length. Such degraded forms of Diptera are the connecting links between the true six-footed insects and the order of Arachnids (spiders, mites, ticks, etc.). The reader should compare the Nycteribia with the young six-footed moose-tick figured on page 559 of the NATURALIST. Another spider-like fly is the *Chionea valga* (Pl. 13, fig. 12), which is a degraded Tipula, the latter genus standing near the head of the sub-order Diptera. The Chionea, according to Harris, lives in its early stages in the ground like many other gnats, and is found early in the spring, sometimes crawling over the snow.

We have also figured and mentioned previously (page 197) the Bee-louse, *Braula*, another wingless spider-like fly.

The Flea is also a wingless fly, and is probably, as has been suggested by an eminent entomologist, as Baron Osten Sacken informs us, a degraded genus of the family to which Mycetobia belongs. Its transformations are very unlike those of the fly-ticks, and agree closely with the early stages of Mycetophila, one of the Tipulid family. In its adult condition the flea combines the characters of the Diptera, with certain features of the grasshoppers and cockroaches (Orthoptera), and the bugs (Hemiptera). The body of the human flea (Pl. 13, fig. 13, greatly magnified; *a*, antennæ; *b*, maxillæ, and their palpi, *c*; *d*, mandibles; the latter, with the labium, which is not shown in the figure, forming the acute beak) is much compressed, and there are minute wing-pads, instead of wings, present in some species.

Dr. G. A. Perkins, of Salem, has succeeded in rearing in considerable numbers from the eggs, the larvæ of a flea which lives upon the cat. The larvæ (Pl. 13, fig. 9, much enlarged; *a*, antenna; *b*, the terminal segments of the abdomen), when hatched, are .05 of an inch long. The body is long, cylindrical, and pure white, with thirteen segments exclusive of the head, and provided with rather long hairs. It is very active in its movements, and lives on decaying animal and vegetable matter, remaining on unswept floors of out-houses, or in the straw or bed of the animals they infest. In a few days after leaving the egg the larvæ mature, spin a rude cocoon, and change to pupæ, and the perfect insects appear in about ten days.

A practical point is how to rid dogs of fleas. As a preventive measure, we would suggest the frequent sweeping and cleansing of the floors of their kennels, and renewing the straw or chips composing their beds,—chips being the best material for them to sleep upon. Flea-afflicted dogs should be washed every few days in strong soapsuds, or weak tobacco or petroleum water. A writer in "Science-Gossip"

recommends the "use of the Persian Insect Destroyer, one package of which suffices for a good sized dog. The powder should be well rubbed in all over the skin, or the dog, if small, can be put into a bag previously dusted with the powder; in either case the dog should be washed soon after."

One of the most serious insect torments of the tropics of America is the *Sarcopsylla penetrans*, called by the natives the Jigger, Chigoe, Bicho, Chique, or Pique (Pl. 13, fig. 8, enlarged; *a*, gravid female, natural size). The female, during the dry season, bores into the feet of the natives, the operation requiring but a quarter of an hour, usually penetrating under the nails, and lives there until her body becomes distended with eggs, the hind-body swelling out to the size of a pea; her presence often causes distressing sores. The Chigoe lays about sixty eggs, depositing them in a sort of sac on each side of the external opening of the oviduct. The young develop and feed upon the swollen body of the parent flea until they mature, when they leave the body of their host and escape to the ground. The best preventative is cleanliness and the constant wearing of shoes or slippers when in the house, and of boots when out of doors.

NOTE. — All the figures on Plate 13, except 8 *a*, are enlarged.

A TRIP TO THE GREAT RED PIPESTONE QUARRY.

BY C. A. WHITE, M. D.

THE Great Red Pipestone Quarry, from whence the Indians occupying a large portion of the North American continent have from time immemorial obtained the material for their pipes, has become almost as famous among those who speak the English language as among the aborigines themselves, who, to some extent at least, regard it as a sacred place. This is largely due to the interest which has been

Fig. 3.

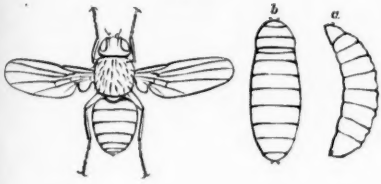


Fig. 7.

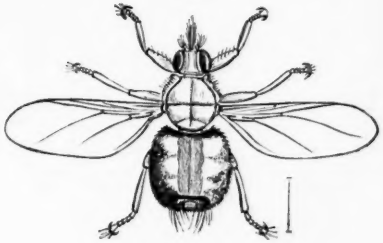


Fig. 9.

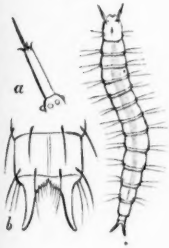


Fig. 4.

Fig. 12.

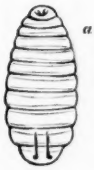


Fig. 2.

Fig. 6.

Fig. 5.

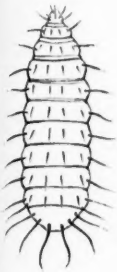


Fig. 10.

Fig. 1.

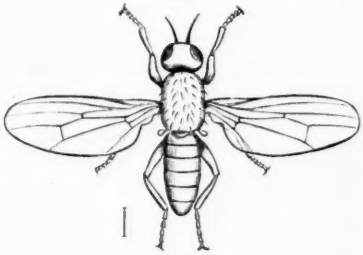


Fig. 8.

13.

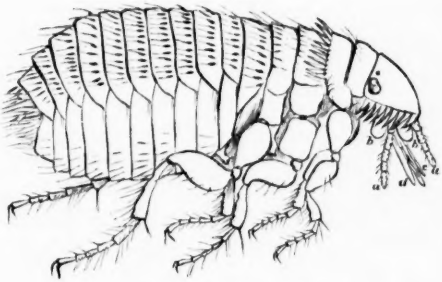
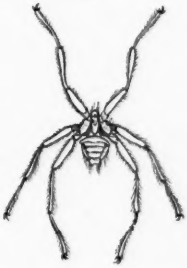


Fig. 11.



PACKARD ON FLIES.

— THE —
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excited by the observations of Catlin and Schoolcraft upon the habits, customs and legends of the Indians, but more especially to the unique poetic form in which our much-loved Longfellow has rendered some of them in his "Song of Hiawatha." Before the reader goes farther let him take down this strange song and read the "Peace-pipe," after which he will better understand the references which follow. In addition to this I will give the substance of the legends which occur in various forms among the Indians of the North-west concerning this famous locality.

"Many ages ago the Great Spirit, whose tracks in the form of those of a large bird are yet to be seen upon the rocks descending from the heavens, stood upon the cliff at the Red Pipestone. A stream issued from beneath his feet, which, falling down the cliff, passed away in the plain below, while near him, on an elevation, was the Thunder's nest in which a small bird still sits upon her eggs, the hatching of every one of which causes a clap of thunder. He broke a piece from the ledge, and formed it into a huge pipe and smoked it, the smoke rising in a vast cloud so high that it could be seen throughout the earth, and became the signal to all the tribes of men to assemble at the spot from whence it issued, and listen to the words of the Great Spirit. They came in vast numbers and filled the plain below him. He blew the smoke over them all, and told them that the stone was human flesh, the flesh of their ancestors, who were created upon this spot; that the pipe he had made from it was the symbol of peace; that although they should be at war, they must ever after meet upon this ground in peace and as friends, for it belonged to them all; they must make their calumets from the soft stone, and smoke them in their councils, and whenever they wished to appease him or obtain his favor. Having said this, he disappeared in the cloud which the last whiff of his pipe had caused, when a great fire rushed over the surface and melted the rocks, and at the same time two squaws passed through the fire to their places beneath

the two medicine rocks, where they remain to this day as guardian spirits of the place, and must be propitiated by any one wishing to obtain the Pipestone before it can be taken away."

While tracing up to their original ledges in North-western Iowa and the adjacent parts of Dakota and Minnesota, the boulders of red quartzite profusely scattered in the drift of Western Iowa and Eastern Nebraska, I was led to visit this famous locality, and now propose to give a brief description of its real character and surroundings. But while correcting the fallacies of the Indian legends, no wish is entertained of diminishing popular interest in them, nor in the beautiful rendering of them by the poet; yet every naturalist, however attractive legendary lore or poetic forms of expression may be to him, really desires to know the exact truth, even if it diminishes the pleasure he feels in the enchanting narrations of story or song.

Leaving Sioux City and going northward along the east side of the Big Sioux River, we soon pass the northern limit of the bluff formation, with the strange beauty of its smoothly rounded hills, described in a former number of the NATURALIST, and enter upon the broad prairie which continues without interruption far to the eastward, still farther to the northward into Minnesota, and farther still to the westward towards the Rocky Mountains. Rocks of Cretaceous age are occasionally exposed in the bluffs of the river for a dozen miles above its mouth, but being friable, they are soon lost from sight beneath their own debris and the heavy drift-mantle that everywhere covers the earth; and the only rocks we see in many miles of travel are occasional boulders of granite and red quartzite embedded in the deep, rich soil. Streams of considerable size traverse some portions of this wide region, but they are hardly able to arrest the fierce fires of the prairie which annually prevail, for they rush up to their very margins, and sometimes even leap the watery space and carry on their work of destruction

beyond. A few clumps of willows upon their margins, and a few groves upon the islands or in the bends of the streams, only escape destruction, and are the only objects remaining to give diversity to the landscape, except the bald bluffs bordering the larger streams.

A journey of eighty miles over such a country as this brings us to the north-western corner of the State of Iowa, where we first find ledges of the red quartzite in place, which we have traced as scattered boulders, step by step from the Missouri state line, more than two hundred miles away to the southward.

Following up the Big Sioux from this point, we find the quartzite exposed at frequent intervals along the valley, and reaching Sioux Falls, twenty miles by way of the crooked river, but only ten miles in a direct line north-westward from the State corner, we find a magnificent exposure of the same rock extending across the river, and causing a series of falls of sixty feet in aggregate height, within the distance of half a mile, which for romantic beauty are seldom surpassed.

This quartzite is of a nearly uniform brick-red color, intensely hard, quite regularly bedded, the bedding surfaces sometimes showing ripple markings as distinct as any to be seen upon the sea-shore of the present day, and which were made in the same manner untold ages ago, when this hard rock was a mass of incoherent sand, the grains of which are even now distinctly visible. In a few localities it presents the characters of conglomerate, the pebbles being as clearly silicious as the grains of sand. At Sioux Falls, Fort Dakota is located. Those who have never enjoyed the hospitality of our distant military posts, cannot appreciate the full meaning of that word as we did, in the welcome extended to our tired party, by Col. Wm. A. Olmstead, the Commandant, and Dr. J. Frazer Boughter, the Surgeon.

After divers and sundry ablutions, rendered all the more necessary by many days of toil and travel upon the open prairie beneath a July sun, we prepare ourselves for a day's

rest under the protection of our newly found friends and our country's flag. At Sioux Falls, near the top of the exposure, a layer of Pipestone occurs intercalated with the quartzite, which leads us to believe that the rock at the famous Quarry is the same, and we decide to visit it. After discussing the probabilities of there being roving parties of hostile Sioux in the vicinity, and the necessity for the presence of the good doctor in his hospital for a couple of days, it is finally agreed that he shall accompany us under the escort of an Indian guide given us by the Commandant. Our guide, we are assured, is "a pretty good Indian," notwithstanding the fact that he was one of Little Crow's band who were engaged in the massacres of New Ulm and Jackson, Minnesota—the recital of which, by the survivors, has made our hearts sick as we have listened to them, upon the scenes of the butcheries where the marks of their violence still remain—for is it not six years since all that happened? and did not the missionaries labor faithfully with him during the two years of his imprisonment at Davenport for his crimes?

The morning rose clear and beautiful after a refreshing rain of the previous night, and off we go, "six precious souls," including the reformed baby-killer, who rides before us on his pony with that posture and carriage peculiar to the Indian, his legs dangling upon each side as if every bone in them had been broken and had united by cartilaginous union, while we, the other five, seated in our camp wagon, follow upon the dim road or the *tepe trail* over the broad prairie, striving to keep in sight of our guide, who is sometimes several miles ahead of us. Our course is about north north-east from the fort, and when we lose sight of the narrow, interrupted belt of trees which skirts the Big Sioux, not another tree greets our vision in the whole journey of forty miles, save a single elm by the side of a small creek, where we halt to take our mid-day meal. Here our guide tells us we must gather a bundle of faggots from the willows of the brook, which last year's fires had killed but not con-

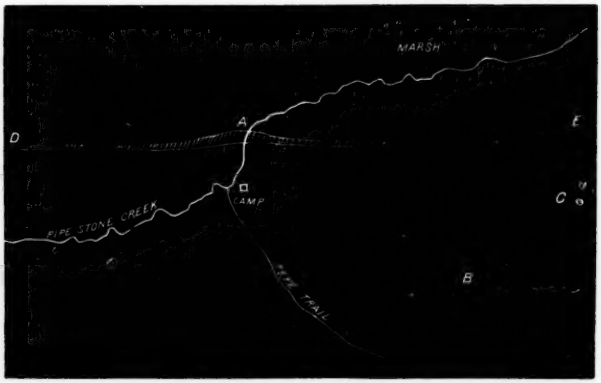
sumed, or we shall have no camp-fire at the Pipestone, where we must pass the night.

On we go, after a hasty meal, for twenty miles of our journey is yet to be made, and we lose sight of the only tree we shall see until we return to the fort. There is nothing around us or beneath us but the gently undulating prairie with its dense growth of grass and flowers, and nothing above us but the open sky. Twice or thrice we detect small exposures of the red quartzite in the depressions occupied by the small prairie streams, with their surfaces scored by the boulder-laden glaciers which moved over them long ago. Now and then a solitary boulder, fellows of those that scored the surfaces of the rocks in place, peers up out of the rich loamy soil. Now and then the whitening skull of a buffalo, or the huge cast-off antlers of an elk, partially hidden by the rank grass, arrests our attention, but these are familiar things, and we pass the time in conversation upon various topics until late in the afternoon, when our guide halts upon an eminence before us. Upon coming up, he merely says "Pipestone" as he points forward, and there, three miles away in the distance, is the famous spot.

We had not expected to see conspicuous features of the landscape anywhere in such a region as this, and yet we were somewhat disappointed to find that the narrow ledge of rocks in the broad shallow valley of a little prairie creek, lying entirely below the general prairie level, constitutes all there is of the Great Pipestone Quarry. As far as the eye can reach in every direction, no "mountain of the prairie," no grove, no tree, no habitation, no living thing except a few birds, is in sight. From our maps and Government surveys, we know the spot is within the State of Minnesota, about thirty miles in a direct line from its south-western corner, and three or four miles from its western boundary. Approaching it, the exposure of rocks appears much greater than it did in the distance, when it looked like a mere line

of broken rocks in the open prairie, for our view then took in the whole region for many miles around it.

The annexed diagram, although drawn merely from memory and without linear measurements, will serve in some degree to give an idea of the relative positions of the principal features of the locality. D E is intended to represent the principal exposure of rocks, which is about a mile in length from north to south, in both of which directions it



Great Pipestone Quarry.

becomes gradually lost from view beneath the surface of the prairie. It faces the west, and reaches its greatest perpendicular height, about twenty feet, at A, where "Gitche Manito, the mighty," is supposed to have stood when he took his wonderful smoke, and where the brook falls over it into the plain below. All the rock we see is the red quartzite and a few granite boulders whose original home is still farther north, and we look some time in vain for the Pipestone, for our guide volunteers no information, and we have forgotten in our eagerness to ask him. But our cook calls to supper, and all of us satisfy our hunger, a different thing by the way for *Mazachistina*, alias John Baker, whose appetite seems as insatiate as that of a grist-mill. Having finished this delightful task, he becomes more communicative and

goes to show us the Pipestone, which deposit of aboriginal treasure we find in the plain an eighth of a mile west of the principal exposure of the rock, occupying a shallow ditch (B) a quarter of a mile long, and running parallel with it. The Pipestone is in somewhat thin and usually shaly layers, and only from eight to twelve inches in aggregate thickness, and is the lowest layer found here. The red quartzite rests immediately upon it, and is four or five feet thick at the ditch, and must be removed to get the Pipestone. This has been accomplished with great labor by the Indians, for they do not even now use suitable implements to remove it. The ditch occupies about the middle of the space referred to as the plain, and from it the ground rises gently both eastward and westward. To the westward the rise to the general prairie level is uninterrupted, and no more rock is seen in that direction. To the eastward the gentle rise is interrupted by the abrupt face of the quartzite ledges, between which and the ditch frequent exposures of the same rock are seen upon the nearly level surface. The actual height from the Pipestone in the bottom of the ditch, which is about the lowest point in the vicinity, to the top of the ledges at A, which point is just below the general level of the prairie, is only forty feet, but the dip of all the rocks to the eastward is such as to show an actual thickness of strata amounting to one hundred and fifty feet. This dip causes the top ledges to disappear rapidly to the eastward beneath the marshy surface, and they are seen no more in that direction. The "Medicine Rocks," (C) towards the southern end of the plain, rest directly upon the glacier-smoothed surface of the quartzite. We see the distinct striæ beneath and around them, and feel almost as if we had caught them in the very act of making their tracks, for they are granite strangers from the northward, and we have visited the place where they were born, and know them and their generation. The two largest of these boulders are some twelve or fifteen feet in diameter, and are the ones believed by the Indians to

cover the two squaws mentioned in the legend. Along the low and less abrupt portions of the ridge of rock, the surface has a glazed and sometimes even a polished appearance, which the legend refers to the effects of the fire through which the squaws passed beneath the Medicine Rocks, but being a geologist and not an Indian, I would suggest that it was produced by grains of sand carried by the almost constant winds, and taken up from the soil, which, although fertile, contains a perceptible quantity.

Many square yards of the glacier-smoothed surface at the Medicine Rocks are covered thickly with Indian hieroglyphics, made by pecking the hard surface with sharp-pointed stones. These are of various grotesque forms, intended to represent persons, animals of the region, turtles, and very many also *in the form of the tracks of a large bird*. It is getting dark, and we defer collecting specimens of Pipestone until morning, and repair to camp and to bed. But memories and passing incidents crowd so thickly upon us that we cannot sleep. A summer storm is sweeping along to the northward of us. We see its dim flashes and hear its mutterings in the direction of the "Thunder's nest." *That* thunder was surely not hatched there, but before darkness overtook us at the "nest"—which by the way is a scarcely perceptible rise of surface—we had found upon the bare rock two or three pairs of the eggs of that "small bird" mentioned in the legend. It is the Night-hawk (*Chordeiles Henryi?*). We smiled at the strange conceit that the hatching of the eggs causes thunder, but we were, nevertheless, startled at the unearthly rumbling cry of the parent bird, as it swooped down over our heads while we were carrying its treasures away.

The morning comes and we ramble along the creek to replenish our wasting bundle of faggots. A few stunted Common Willows (*Salix longifolia?*) grow along the banks, but no "Red Willow" (*Cornus stolenifera*), the bark of which, under the name of Kinnikinnick, is smoked by the Indians

in the place of tobacco, grows here. The Reed-grass (*Phragmites communis*) grows in all wet places here, as well as throughout the north-west, but it is seldom if ever used by the Indians for their pipestems. They commonly use a strong piece of young ash wood, from which they punch the pith to make the bore.

The form and size of the pipes made by the Indians requires so large a piece of stone, that we have no difficulty in obtaining all the specimens we desire from the rejected pieces strewn upon the ground. Our specimens packed in the wagon, and our camp broken up, we start on our return to the fort by the *tepe trail* shown in the diagram. Mazachistina mounts at the same time, but starts off towards the Medicine Rocks, around which he makes a rapid turn and overtakes us upon the road. He is utterly silent when we ask him why he went there, but we should doubtless be thankful that we got away with our Pipestone in safety from the wrath of the guardian spirits of the Medicine rocks.

But some one asks, "What is this Pipestone, and what is its composition?" It is chemically a clay (silicate of alumina) colored brick-red with per-oxide of iron. It is too heavy for pipes for white men, and is valued by them almost entirely for its legendary interest. It is heavier, harder, and in every respect inferior to meerschaum,—silicate of magnesia,—yet the purer specimens may be worked without much difficulty with a common saw, file, or knife, and readily takes and retains a considerable polish. Geologically it is metamorphic clay, as the quartzite is metamorphic sandstone. It was originally a layer of clay intercalated between layers of sandstone, and the same metamorphic action that changed the latter to a quartzite, also converted the clay into Pipestone.

REVIEWS.

COMPARATIVE ANATOMY AND MEDICAL ZOÖLOGY.*—As its title purports, so do we find its contents. The "Outlines" are carefully drawn and well filled out, and the student of comparative anatomy will find it a hand-book that will be convenient at all times. It is gratifying to find so rational a view of classification as the author here presents. He seems to appreciate fully the various subdivisions among animals, though we disagree with him in his adopting Leuckart's class *Cœlenterata*. It seems to us that Agassiz has never made a clearer point than in his demonstrations of the class value of Polyps and Acalephs, and he (Agassiz) excuses the readiness with which German naturalists acquiesce in Leuckart's bringing together these two classes under the above title, from the fact that their opportunities for studying the various members of the two classes are limited. Perhaps the same apology might be made for Dr. Allen! Under such headings as Skeleton, Articulation, Teeth, Digestive System, etc., he passes in each case from the lowest to the highest animals, mentioning briefly the characters under discussion possessed by both. Thus, for example, under Kidneys, we have: "*Myriapoda*,—Kidney composed of long convoluted tubes," etc. "*Arachnida*, several cœca empty into intestinal canal," etc.

In a work of this character requiring the collation of so many facts, it would not be surprising to find a few mistakes or oversights, and we point out for correction those that have already attracted our attention. He says that in Polyzoa no nervous system has with certainty been detected. A nervous ganglion has been recognized by Fritz Müller among the marine forms, and by Allman, Dr. Nitche, Mr. Hyatt, and others, among the fresh-water species. Two branches from this ganglion have been figured. It is stated that no organ among the Invertebrata has been definitely assigned to the functions of smelling. Moquin Tandon has quite conclusively shown, we think, that in the minute nerve termini, at the extremity of the upper tentacles of land inoperculate pulmonates is seated the sense of smell. It is stated also (evidently a slip of the pen) that fresh-water snails carry their eyes at the tip of the tentacles, whereas it is just the reverse, and that marine species carry their eyes at the outer base of the tentacles; this is true with several important exceptions. The statement is made that the eyes of *Natica* and *Bulla* are conspicuous, while they are quite inconspicuous or wanting. It is stated that among the lowest animals the eye and ear resemble each other so closely that it is difficult to distinguish them apart,,but that the presence of the vibrating otolites will afford a distinction. Would not another reason be found in the external position of one, and the internal position of the other?

*Outlines of Comparative Anatomy and Medical Zoölogy. By Harrison Allen, M. D. J. B. Lippincott & Co. 1868. pp. 190, 8vo.

At the end of the book there is a table of classification, including three hundred and eight genera mentioned in the pages. This number does not include several names inadvertently tabulated with them, which apply only to the larval condition of animals. We say inadvertently, since the matter is correctly given in the preceding pages. We again cordially commend this book as one possessing a vast amount of matter, concisely stated, and clearly arranged, and when one considers the unusually large space allotted to the invertebrate animals, remarkably free from errors.

ENTOMOLOGIST'S ANNUAL FOR 1868.—It is proposed, should sufficient encouragement be given, to publish a Year Book of Progress in American Entomology, to be edited by Dr. A. S. Packard, jr. Dr. J. L. Le Conte will contribute a chapter on the Coleoptera; Mr. S. H. Scudder chapters on the Butterflies and Orthoptera; Baron R. Osten Sacken a chapter on the Diptera; Mr. P. R. Uhler a chapter on the Hemiptera and Neuroptera; and the Editor expects to receive aid from other entomologists. It is hoped it will prove a useful hand-book to every one interested in the study of insects. It will be published in 12mo size in the spring of 1869. An edition of five hundred will be printed, provided three hundred names can be secured. Will all entomologists desirous of aiding in the publication of such an annual, send in their subscriptions in advance, that the means of publishing such a useful book be afforded at the outset? Subscriptions, *seventy-five cents* a copy, received by W. S. West, Peabody Academy of Science, Salem, Mass.

Will our scientific and secular exchanges please copy this prospectus, and urge their readers to encourage the undertaking?

VOYAGE THROUGH THE GRAND CANON OF COLORADO.—An extract from the Transactions of the St. Louis Academy of Natural Science, Vol. II, pp. 449–453, contains a report by C. C. Parry, Assistant Geologist to J. D. Parry, President of the Eastern Division of the Union Pacific Railroad, giving a detailed account of the extraordinary voyage of James White of Callville, through the Grand Cañon. It seems that a party of three, of which he was one, was attacked by Indians on the banks of Grand River. Two of them escaped, built a raft and embarked upon it, preferring to risk the chance of reaching the settlements by way of the river, than the certain destruction of a retreat by land. About thirty miles beyond they passed the mouth of Green River, and were in the Colorado proper. Henceforth their way lay through the sullen and hitherto untraversed depths of the Grand Cañon, whose precipices gradually rise above the narrowing stream a little below the junction. The mouth of the San Juan was passed, some forty miles farther on, without accident, but on the fourth day out they encountered the first rapids. These swept off Henry Strole, and all the provisions, leaving White to pursue the voyage alone. One hundred and eighty miles farther on he passed the mouth of the Colorado Chiquito, after having passed through a series of "fearful" rapids, from which his escape upon a raft threatening every moment to come to pieces, was hardly less than miraculous.

From this place to Callville, Mr. Parry estimates the distance at three hundred miles. The time occupied in the journey was fourteen days, "during seven of which Mr. White was without food of any description." The geographical discoveries consist in the approximate estimates of the length of the river, made upon the supposed rate of the flow of the current. These, as have been given, make the inaccessible parts of the Colorado proper, about five hundred miles long, following the winding of the bed, which is "very crooked." The location of the mouths of the San Juan, Colorado Chiquito, and his general description of the character of the sides of the Cañon are also valuable. These are described as "flaring" outwards, and composed throughout the greater part of their extent of light-colored rocks, probably the "Cretaceous and lower stratified rocks" of Newberry. The "average elevation" is placed at 3,000 feet, which is below that supposed by Ives and Newberry to be the average depth of the chasm. If this is so, the bed of the stream must rise rapidly above the point at which it was approached by the Ives expedition, for at that place they made it out with the aid of their instruments to be 5,000 feet. It is not generally known that Dr. Newberry has been upon a second expedition to this remarkable region, and that the results, though written out before the war, still lay unpublished at Washington. When the report of this expedition is published we may hope for more accurate information.

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NATURAL HISTORY MISCELLANY.

BOTANY.

WHITE VARIETIES OF FLOWERS.—In the NATURALIST for June Mr. Broadhead mentions having seen *Lobelia syphilitica* and *Vernonia Noveboracensis* with white flowers. Of the same species of *Lobelia* I saw several white flowered specimens last September, near Rock Lake, in Jefferson County, Wisconsin. I have also observed the white flowered variety of *Vernonia Noveboracensis* in Pratt County, Illinois, during the past season. I can add to the list of floral albinos, already brought to notice in

the NATURALIST, the following, which I believe have not been mentioned by any writer, viz.: *Viola cucullata*, *Viola sagittata*, *Phlox pilosa*, and *Gerardia aspera*. All these have fallen under my observation in Southern Wisconsin during the past eight years. I observe also that in all of these plants the *foliage* is paler in the white flowered specimens. For example: *Gerardia aspera* has, in Wisconsin, almost always a purple stem and purplish foliage, but in the albino specimens, of which I have seen at least half a dozen, the stem and leaves were a very light green.

In the November number Mr. Meehan mentions a Saxifraga as growing wild with double flowers, and enquires, "Has any other double flower been found?" I reply that some six years since a rue anemone (*Anemone Thalictroides*) grew in a wood pasture near Albion, Wisconsin, with flowers perfectly double. After being transplanted to my mother's flower garden, it never flowered again, and finally disappeared. I also took a specimen of *Helianthus giganteus*, in October of the last year, from its native prairie soil, in Pratt County, Illinois, with all the flowers ligulate in the manner of the so-called double flowers of the florists of this natural order. — EDWARD L. GREENE, *Decatur, Ill.*

MORE WHITE VARIETIES.—The past season appears to have been unusually prolific in white flowers. In north-eastern Minnesota (shore of Lake Superior) I discovered a marked white variety of *Lobelia Kalmii L.* The plant was devoid of the purple tinge which generally pervades it more or less, and the corolla was pure white with a few pale yellow markings. It grew in abundance on damp rocks, in close proximity to the common form. I had observed previously the *Erigeron Philadelphicum* L., with white rays, which are usually of purple or flesh color. A friend informs me he has found this year, with white flowers, *Spirea tomentosa* L., *Cirsium arvense* Scop., *Trifolium pratense* L., *Statice limonium* L., and *Gentiana saponaria* var. *linearis* Gr. We have had reported also *Cypripedium arietinum* R. Brown, and *Lobelia syphilitica* L. It would be most interesting to know if there is any influence of the season to produce this apparent abundance of white varieties, whether those variations are permanent, etc. I wish to call the attention of your readers to the subject, so that if any corroborative facts have fallen under their observation, they may kindly inform us. This may furnish conclusive testimony that certain seasons are remarkable in this way, and that that of 1868 was one of them.

From the *Lobelia cardinalis* L., and *L. syphilitica* L., having been not unfrequently found with white flowers, and a white variety of the *L. Kalmii* L. being now added to the group, it would appear that the genus is inclined to produce white varieties. Some plants have undoubtedly a peculiar inclination to this. I would add that, several years ago, I saw a single instance of *Campanula rotundifolia* L. with a white bell. The tendency of species all through creation to produce varieties is a subject of such deep interest, that anything which casts light on it is of special value. — HENRY GILLMAN, *Detroit, Michigan.*

BIDENS FRONDOSA.—The common Beggar-ticks are classified by the standard botanical authors as *rayless*, but Asa Gray (Manual, 2d. Ed., page 222) says, Dr. Sartwell has found it in western New York with one or two small rays. I have observed rays on this plant for several years. For the last two summers I have observed it more closely, and never found one plant without rays. The full number of rays are not always seen, but frequently the full number of eight rays are present. The ray is small and very caducous. To be seen, the head must be watched every day as it is opening, for the beautiful little ray only remains a day or two after its appearance. This plant is very abundant here. I have observed rays on thousands of specimens, and now at the close of this season am entirely convinced that it does not exist in this region without rays. It grows very luxuriantly here, often seven or eight feet high; but whether one or eight feet high, it makes no difference. The rays can always be found by close watching.

From the continual presence of the ray in this region, I am inclined to believe that there is something different in its development here, compared with the *B. frondosa* L. at the East, for if the rays were present so frequently at the East, the several masters of this science there could not have failed to observe it. And therefore as the ray is not found at the East, would there be any impropriety in assigning this a specific, or at least a variety name? The leaves here are often seven-divided, and the lower leaflets have two little secondary leaflets at their bases. If any Eastern botanist wishes to cultivate it, and thus try the effect of climate on it, he can have seed by applying to me soon.—HENRY SHIMER, *Mt. Carroll, Ill.*

BIDENS FRONDOSA.—The earliest heads of flowers of *Bidens frondosa* are usually radiate, with from two to ten small rays. The later heads are usually not radiate. Is it so elsewhere? If any persons wish specimens of the *Scolopendrium officinarum*, etc., I can furnish them, as I have about one hundred and twenty-five specimens on hand I would like to exchange for other plants, especially southern ones. This fern grows in great abundance around Green Lake and vicinity, in this county.—SAMUEL N. COWLES, *Otisco, Onondago County, N. Y.*

ABNORMAL FORM OF THE SENSITIVE FERN.—I found growing near here this summer a curious abnormal form of *Onoclea sensibilis*, in which all the pinnæ on one side of the stipe, except one, are much contracted, rolled up, and filled with *sporangia*, as in the natural form of this fern, while those on the opposite side of the stipe are twice pinnate, very slightly revolute, and some of them slightly contracted, but without losing their foliaceous character and bearing fruit; dots covered with the indusium, as in the var. *obtusilobata*. The curious state of this plant would seem to be intermediate between the true form of *Onoclea sensibilis*, and the var. *obtusilobata*. It certainly is analogous to the latter, though presenting a curious union of both. Professor Gray, in the "Manual" states that some such form of *Struthiopteris* has been found, but whether such a state in this fern is often found, I am uncertain.

Plants agreeing well with the var. *obtusilobata* were found growing near this one, and from the same rootstock of the common species. — CLAUDE CRITTENDEN, *Rochester, N. Y.*

ZOÖLOGY.

THE BUTCHER BIRD AND MOTTLED OWL. — In Volume II, No. 7, page 380, the question is asked by Dr. Wood, if the *Collyrio borealis* has been known to return to animals which it has killed and empaled, or hung upon trees. Only one instance has come under my notice, and that was some years since, in the latter part of November. A Butcher bird returned to a pear tree upon which grasshoppers had been empaled and devoured them, though they had remained there some weeks and had become dry. I should like to ask any person who is acquainted with the habits of the Shrike if they kill and empale animals at all seasons of the year, or only two or three months preceding winter.

There is something singular with regard to the vision of the Mottled Owl, which the Doctor notices in an article on the Mottled Owl, in the same volume and number, on page 373. I was once in search of the nest of this owl, and in passing under an apple tree, I saw what seemed to be a part of a bird protruding from a limb of the tree, and in climbing up to the spot, I found a male Mottled Owl, with his head and shoulders thrust into a small cavity in the limb. I took him out and perched him upon my finger, where he stood for some minutes. I put my hand upon his back and smoothed down his feathers, when he would turn his head and look me full in the face and snap his bill. I stretched out his wings and handled him other ways. At last he flew in a direct line for an apple tree, standing about eight rods distant, and entered a hole in a rotten branch of the tree as readily as if it had been in the night-time. This occurred when the sun was shining brightly, at about noon. — AUGUSTUS FOWLER, *Danvers, Mass.*

SHEDDING OF THE HORNS OF THE AMERICAN ANTELOPE (*Antilocapra Americana**). — My experience in regard to the shedding of antelope's horns is this: I have killed bucks and does in October and November, and the first of December, and after the heads have become dry, the horns slip from the pith, which appeared to extend to a little above the prong; but the prong was only noticed as extending upwards, and not beyond a line extending downwards towards the but of the horn; and in spring I have found on bucks and does a soft hairy horn within an inch or two of the point which would become hard. Does' horns are about one-half or a third of the length of those of the bucks.

I owned a buck which I got when about four months old, and in March he had horns about one and a half inches long, a little before he was a year old, and shed about three quarters of an inch, and as I kept him well, and castrated him in August (to keep him from leaving), he shed about

* Communicated in a letter received by the Smithsonian Institution, Washington, D. C.

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BOTANY.

WHITE VARIETIES OF FLOWERS.—In the NATURALIST for June Mr. Broadhead mentions having seen *Lobelia syphilitica* and *Vernonia Noveboracensis* with white flowers. Of the same species of *Lobelia* I saw several white flowered specimens last September, near Rock Lake, in Jefferson County, Wisconsin. I have also observed the white flowered variety of *Vernonia Noveboracensis* in Pratt County, Illinois, during the past season. I can add to the list of floral albinos, already brought to notice in

the NATURALIST, the following, which I believe have not been mentioned by any writer, viz.: *Viola cucullata*, *Viola sagittata*, *Phlox pilosa*, and *Gerardia aspera*. All these have fallen under my observation in Southern Wisconsin during the past eight years. I observe also that in all of these plants the *foliage* is paler in the white flowered specimens. For example: *Gerardia aspera* has, in Wisconsin, almost always a purple stem and purplish foliage, but in the albino specimens, of which I have seen at least half a dozen, the stem and leaves were a very light green.

In the November number Mr. Meehan mentions a Saxifraga as growing wild with double flowers, and enquires, "Has any other double flower been found?" I reply that some six years since a rue anemone (*Anemone Thalictroides*) grew in a wood pasture near Albion, Wisconsin, with flowers perfectly double. After being transplanted to my mother's flower garden, it never flowered again, and finally disappeared. I also took a specimen of *Helianthus giganteus*, in October of the last year, from its native prairie soil, in Pratt County, Illinois, with all the flowers ligulate in the manner of the so-called double flowers of the florists of this natural order. — EDWARD L. GREENE, *Decatur, Ill.*

MORE WHITE VARIETIES.—The past season appears to have been unusually prolific in white flowers. In north-eastern Minnesota (shore of Lake Superior) I discovered a marked white variety of *Lobelia Kalmii L.* The plant was devoid of the purple tinge which generally pervades it more or less, and the corolla was pure white with a few pale yellow markings. It grew in abundance on damp rocks, in close proximity to the common form. I had observed previously the *Erigeron Philadelphicum* L., with white rays, which are usually of purple or flesh color. A friend informs me he has found this year, with white flowers, *Spirea tomentosa* L., *Cirsium arvense* Scop., *Trifolium pratense* L., *Statice limonium* L., and *Gentiana saponaria* var. *linearis* Gr. We have had reported also *Cypripedium arietinum* R. Brown, and *Lobelia syphilitica* L. It would be most interesting to know if there is any influence of the season to produce this apparent abundance of white varieties, whether those variations are permanent, etc. I wish to call the attention of your readers to the subject, so that if any corroborative facts have fallen under their observation, they may kindly inform us. This may furnish conclusive testimony that certain seasons are remarkable in this way, and that that of 1868 was one of them.

From the *Lobelia cardinalis* L., and *L. syphilitica* L., having been not unfrequently found with white flowers, and a white variety of the *L. Kalmii* L. being now added to the group, it would appear that the genus is inclined to produce white varieties. Some plants have undoubtedly a peculiar inclination to this. I would add that, several years ago, I saw a single instance of *Campanula rotundifolia* L. with a white bell. The tendency of species all through creation to produce varieties is a subject of such deep interest, that anything which casts light on it is of special value. — HENRY GILLMAN, *Detroit, Michigan.*

BIDENS FRONDOSA.—The common Beggar-ticks are classified by the standard botanical authors as *rayless*, but Asa Gray (Manual, 2d. Ed., page 222) says, Dr. Sartwell has found it in western New York with one or two small rays. I have observed rays on this plant for several years. For the last two summers I have observed it more closely, and never found one plant without rays. The full number of rays are not always seen, but frequently the full number of eight rays are present. The ray is small and very caducous. To be seen, the head must be watched every day as it is opening, for the beautiful little ray only remains a day or two after its appearance. This plant is very abundant here. I have observed rays on thousands of specimens, and now at the close of this season am entirely convinced that it does not exist in this region without rays. It grows very luxuriantly here, often seven or eight feet high; but whether one or eight feet high, it makes no difference. The rays can always be found by close watching.

From the continual presence of the ray in this region, I am inclined to believe that there is something different in its development here, compared with the *B. frondosa* L. at the East, for if the rays were present so frequently at the East, the several masters of this science there could not have failed to observe it. And therefore as the ray is not found at the East, would there be any impropriety in assigning this a specific, or at least a variety name? The leaves here are often seven-divided, and the lower leaflets have two little secondary leaflets at their bases. If any Eastern botanist wishes to cultivate it, and thus try the effect of climate on it, he can have seed by applying to me soon.—HENRY SHIMER, *Mt. Carroll, Ill.*

BIDENS FRONDOSA.—The earliest heads of flowers of *Bidens frondosa* are usually radiate, with from two to ten small rays. The later heads are usually not radiate. Is it so elsewhere? If any persons wish specimens of the *Scolopendrium officinarum*, etc., I can furnish them, as I have about one hundred and twenty-five specimens on hand I would like to exchange for other plants, especially southern ones. This fern grows in great abundance around Green Lake and vicinity, in this county.—SAMUEL N. COWLES, *Otisco, Onondago County, N. Y.*

ABNORMAL FORM OF THE SENSITIVE FERN.—I found growing near here this summer a curious abnormal form of *Onoclea sensibilis*, in which all the pinnæ on one side of the stipe, except one, are much contracted, rolled up, and filled with *sporangia*, as in the natural form of this fern, while those on the opposite side of the stipe are twice pinnate, very slightly revolute, and some of them slightly contracted, but without losing their foliaceous character and bearing fruit; dots covered with the indusium, as in the var. *obtusilobata*. The curious state of this plant would seem to be intermediate between the true form of *Onoclea sensibilis*, and the var. *obtusilobata*. It certainly is analogous to the latter, though presenting a curious union of both. Professor Gray, in the "Manual" states that some such form of *Struthiopteris* has been found, but whether such a state in this fern is often found, I am uncertain.

Plants agreeing well with the var. *obtusilobata* were found growing near this one, and from the same rootstock of the common species. — CLAUDE CRITTENDEN, *Rochester, N. Y.*

ZOÖLOGY.

THE BUTCHER BIRD AND MOTTLED OWL. — In Volume II, No. 7, page 380, the question is asked by Dr. Wood, if the *Collyrio borealis* has been known to return to animals which it has killed and empaled, or hung upon trees. Only one instance has come under my notice, and that was some years since, in the latter part of November. A Butcher bird returned to a pear tree upon which grasshoppers had been empaled and devoured them, though they had remained there some weeks and had become dry. I should like to ask any person who is acquainted with the habits of the Shrike if they kill and empale animals at all seasons of the year, or only two or three months preceding winter.

There is something singular with regard to the vision of the Mottled Owl, which the Doctor notices in an article on the Mottled Owl, in the same volume and number, on page 373. I was once in search of the nest of this owl, and in passing under an apple tree, I saw what seemed to be a part of a bird protruding from a limb of the tree, and in climbing up to the spot, I found a male Mottled Owl, with his head and shoulders thrust into a small cavity in the limb. I took him out and perched him upon my finger, where he stood for some minutes. I put my hand upon his back and smoothed down his feathers, when he would turn his head and look me full in the face and snap his bill. I stretched out his wings and handled him other ways. At last he flew in a direct line for an apple tree, standing about eight rods distant, and entered a hole in a rotten branch of the tree as readily as if it had been in the night-time. This occurred when the sun was shining brightly, at about noon. — AUGUSTUS FOWLER, *Danvers, Mass.*

SHEDDING OF THE HORNS OF THE AMERICAN ANTELOPE (*Antilocapra Americana**). — My experience in regard to the shedding of antelope's horns is this: I have killed bucks and does in October and November, and the first of December, and after the heads have become dry, the horns slip from the pith, which appeared to extend to a little above the prong; but the prong was only noticed as extending upwards, and not beyond a line extending downwards towards the but of the horn; and in spring I have found on bucks and does a soft hairy horn within an inch or two of the point which would become hard. Does' horns are about one-half or a third of the length of those of the bucks.

I owned a buck which I got when about four months old, and in March he had horns about one and a half inches long, a little before he was a year old, and shed about three quarters of an inch, and as I kept him well, and castrated him in August (to keep him from leaving), he shed about

* Communicated in a letter received by the Smithsonian Institution, Washington, D. C.

two inches or more. They shed their horns about the first of January. They are very easily tamed so as to stand touching by one, but dislike to be rubbed on the back, their hair being so very brittle. They are fond of milk, bread, corn, etc., at any age. Unless they do without milk for a while when about a year old, they will not drink it. They also like a little salt at a time, sugar, candy, etc. I never found but one antelope horn shed on the plains, or heard of any being found (I have made many enquiries about it), and the one I found was partly eaten up by the wolves.—W. M. HINMAN, *Fort Laramie.*

THE WOODPECKER AND SHELDRAKE.—The Downy Woodpecker frequently spreads it wings against the bark to maintain its hold; the stiff quills performing the same office as the tail. It goes up the tree, along the horizontal branches, around the limb sidewise, then a short distance down the trunk, tail first, and lodges itself in the crotches to hammer. It strikes many deft little side blows, ceases work and clings some time as if to rest, with loose plumage, picking its breast and looking about.

Last spring when the Dusky Ducks were migrating, I noticed one morning a large flock separating, in the course of their flight, into distinct pairs. Soon uniting again, it is probable they were seeking their partners if not already mated.

As soon as, or even before the river has begun to open in spring, the Sheldrakes make their appearance, early in the morning, but seldom before sunrise; they fly from the sea, where they probably roost, up the stream. Sometimes they file along one after the other; more often they proceed in no regular order. When they are bound a long distance up stream, they fly high with regular beats, with necks outstretched, and the neutral light which is on them would seem to suggest the flock between dusk and the daylight. On their return down stream, often in pairs or singly, or small parties, they fly close to the surface of the ice or water, and very swiftly. When anything alarms them on the bank, they sometimes croak. If attracted, they turn at a distance, retrace their flight, scale low over the water, throw out their webbed feet and stop with a splash. They look handsomely, their necks deeply curved, the male with such strong contrasts of black and white. They croak and dive with vigor, returning to the surface in a moment. They arise from the water easily, and are soon under good headway. I have never heard any noise from their wings be their flight ever so rapid. I have seen the male on alighting, thrust his bill straight into the air, shake his head, croak and swim away. This may be a token of suspicion, but it is also performed when there is no particular cause for alarm. The croaking noise sounds something like a duck's quack, and evidently expresses a good deal, as I am persuaded from observation on various occasions. One morning, after a cold night, the river was covered with thin ice. Three Sheldrakes came up, flying low, their heads were bent down as if to look closely; making a circuit and scaling close to the ice, they rose again, an old male croaking, saying plainly to my ears, "we can't get in

here." They swim about strongly, almost as if drawn by some powerful electrical attraction, and on coming to the surface after a dive, the head and neck are often thrown back in a very haughty manner. The very soundness of the season and the frozen shore seems in them; but perhaps their amative prospects may have something to do with this exuberance of spirits. It seems as if they could never die. Wounded birds frequently crawl upon the ice, but they do not seem to walk very well. Flocks will alight on the ice before going into the water sometimes, and it is not unusual for a pair to be seen sitting on the ice by a hole where frost-fish are taken. I have seen the Sheldrake standing on a ledge; its figure was awkward, but it did not stand as erect as some other birds whose legs are placed far behind. A little flock is sometimes seen in spring resting in a cove or inlet of the sea; some quite at their ease, others swimming about in that strong way we have alluded to, with necks outstretched.

The Sheldrakes seen on the breaking up of the rivers are as nothing compared to the quantity that follow along the shore a little later, when they come in flocks, from twelve to twenty, and even seventy-five; sometimes flying steadily, two or three deep, above the reach of shot, passing over the bays and headlands. The flocks all go in one direction, — east. Sometimes a few will be seen going in the other direction; but I have seen such turn before lost to vision, and come back again, as if conscious they were wrong. They frequently fly close to the water, as if to vary their journey, their wings evidently being strong enough to allow considerable freedom of will; but they rise from the surface of the water to a gunshot distance when they go over the headlands. If they see a person in the course of their flight, they swerve widely, but often a lone one will, without perturbation, go straight over the fowler. I noticed that most of the flocks in spring appeared to be made up of males. I was told that later the females came along in large flocks. I should like to know about this, and also why so few of these birds, comparatively, are seen in autumn? They are among the birds which form the rear of the great migratory flight in late spring, as well as among the first to appear early in the spring; and "spring ducks" and "spring sheldrake" are common terms at the shore, — everybody knows them. The white on the wings of these birds is noticeable when they are not high, and the dark line on the neck of the male can easily be seen at a gunshot distance, when he is below the eye. They sometimes scale to the water from a height, holding the wings stiff and a little inclined down. They are never as tranquil on the water as the coot, and I could never discover much in their gizzards early in the season, even of those which had been actively engaged. They sometimes swim in close to the shore, immerse their heads and necks, and persistently punch and glean among the pebbles and weeds. The Sheldrake's tail seems to be more a part of the body than do the tails of other water birds, the feathers of the back appearing to descend to the very tip almost; perhaps it can be used somewhat as a rudder when under water. The male is known as a handsome bird, his pure white neck remaining in our memory after being seen once. Its ruddy breast is flecked with artistic niceness; and its sides and

back are finely marked. There is also much character in his crest. The plumage of the female is also admired, with its soft red crested head, white throat, soft leaden back and white under parts. The bill of the female is shorter than that of the male.

The Sheldrake, swimming by the edge of the ice, with the cold snowy bank for a background, is as hardy a picture as New England can furnish. It is a stirring sight in spring, on a bright breezy day, to see the male, a crimson-eyed beauty, feeling fresh in spirits and in costume, going over the rocks, thinking only of the fête in the north.—Wm. E. Barry, *Kennebunk, Maine.*

The Dwarf Thrush again.—I wish to rectify a mistake made in reference to a notice of the *Turdus nanus* being found in Waltham, given by Mr. Samuels, in the June number of the Naturalist. By some accident, the description given by him at that time was not correct, and did not apply to the bird in question. I have, since that time, had two similar birds in my possession, both females; the first was shot May 25th, 1868, in a swampy wood; the second was shot September 21st of the same year. They all resembled *T. Swainsonii*, much more than *T. Pallasii*. The size is small, and there is a distinct bar across the wing; which, however, I do not consider anything more than a mark of immaturity, as it is to be found on the wings of all young thrushes. Taking this and other marks of immaturity into consideration, as they are exhibited by the specimens in question, I have decided them *all* to be young of *T. Swainsonii*.

In regard to the *T. Aliciæ* of Baird being found here or elsewhere, I would say that, having made a long series of careful measurements upon various members of the genus Turdus; and, having seen wide variations in size, and also in intensity of color, in different individuals of the same species, I have come to the conclusion that *T. Aliciæ* consists only of large and somewhat pale specimens of *T. Swainsonii*. I have seen specimens varying in intensity of color between the decidedly rufous sides of the head and breast of the typical *Swainsonii*, and the "faintest possible shade of yellowish red" of *T. Aliciæ*, with also wide variations in size. The largest and smallest measurement that I have made I will give. A male shot in Belmont, May 27th, 1868, in swampy woods, measures 7.76 inches in length; 12.65 in spread of wing; 4.30 wing; 4.00 tail. This bird is large enough truly to be a typical *T. Aliciæ*, but is unfortunately of a decided rufous upon the parts where it should be pale. Another bird shot in Waltham, October 9, 1867, a male, gives the following measurements: Length 6.70; spread 10.16; wing 3.40; tail 2.80 (this being in fact the very specimen described by Mr. Samuels as *T. nanus**). This bird is of a pale buff about the head and across the breast. By this it will be seen that *large* birds are sometimes *bright* in color, and *small* birds *pale*. I have also specimens that compare exactly, both in size and color, with the de-

* It is but just to say, however, that both Mr. Samuels and myself, at that time, thought the bird to be *T. nanus*, being deceived by the small size and its slight resemblance to *nanus*, as described by Prof. Baird. Mr. Samuels has since informed me of his doubts upon the subject.

scription of *T. Aliciæ* and *Swainsonii*. There is also very nearly as wide varieties in specimens of *T. Pallasii* which I have collected.

Without more evidence than is exhibited in the variations in size and intensity of color, in birds so variable in these particulars as I know the thrush to be, it seems to me that extreme caution should be used in deciding upon species. — C. J. MAYNARD.

HABITS OF SNIPES. — In a recent number of the NATURALIST, you ask if any of your readers have seen the snipe (*Scolopax Wilsonii*) alight in trees. I have noticed this in connection with another peculiarity, that of "drumming," as generally called late in the spring when shooting these beautiful little waders. Sometimes, at the report of a gun, a score or more would rise in a wisp, and after drumming awhile alight again. It has been at these times that I have seen them sitting on trees and old stumps, but more frequently on the common worm-fence; they perch, however, but a few moments before they are drumming again. On the northern shore of Lake Superior they have been seen, in fact are seen almost every spring, to come in countless multitudes across the lake, and immediately upon reaching land, alight on the trees in flocks, and rest for a considerable length of time; and although it has no connection with the subject, I would like to have it explained to me how it is that quite often in spring shooting, you find upon drawing your birds that in a day or two at most they would have laid an egg, and they are at least 1,500 miles from their breeding places, and have their nests to make after getting there, which would take altogether two or three days. I do not think it can be explained by saying they may breed south of the British American breeding-places; for in some seasons, like last spring, you will find three out of five in that condition.

Have any of your readers ever seen the Woodcock, *Scolopax minor*, perch on a tree or shrub? I saw one once that was unhurt, and another that was badly wounded. The first got entangled in the leaves and stems of a small bush, and perched on a small limb, and sat there four or five minutes. As I was not more than ten feet from him, I had a good opportunity to study him. The other was wounded late one evening and lost, and the next morning found perched in a bush, where he had remained all night, as proven by the signs underneath the twig on which he sat. He was unable to fly, which may account for it; but the other bird was an old bird, and had not been injured in any way. — WM. W. CASTLE, *Cleveland, Ohio*.

THE SEVENTEEN-YEAR LOCUST. — As it is stated in the NATURALIST that the eggs of the Seventeen-year Locust hatch out, and the larvæ leave the twigs to go into the ground in a few weeks from the time of deposit, I may mention that, since the twenty-eighth of July, I have kept in my study a number of twigs stung by the locust, for observation. No larvæ have yet appeared. Breaking one of the twigs a few minutes ago at the furrow of deposit, I found in it a number of the eggs, one-thirteenth of an inch long, and quite translucent under a pocket lens. The twigs have

been kept under a bell-glass, open at the top. The sun has had but limited access to my study in which they are. Can this explain their non-development?—H. HARTSHORNE, *Haverford College, Phila., Oct.* 17.

[We were by no means *sure* that the eggs of the Cicada hatch in about two weeks, but from the statements of observers, it seemed to us more probable at the time of writing the notes in the August number of the NATURALIST, that they hatched soon after they were laid, rather than forty or fifty days after, as stated by one author. In a very interesting article in the "American Entomologist" for December, page 66, Mr. Riley states that the eggs hatch in about six weeks after being deposited.—EDS.]

REASON OR INSTINCT.—Some years since when a great freshet had flooded the country at the summit of the Illinois and Michigan canal, a boatman observed an Opossum sitting on the top of a fence, part of which projected a foot above the surrounding waters. He took her off, and found in the sack fourteen young ones half-grown. She was so nearly famished that she made no demonstrations of hostility, but eat ravenously whatever was put before her, and soon became quite domesticated. She could easily have saved herself by swimming ashore, but evidently appreciated that it would be at the loss of her family.—J. S. CATON.

IS THE CROW A BIRD OF PREY?—A communication, in the NATURALIST for November, from Mr. Nauman, relates the pouncing down upon a chicken (*a la hawk*) and the carrying it off by a crow; and the enquiry is made whether this is a common practice with this bird. I suppose it is not very common, but in the month of May or June of this year, I saw a crow dash down upon a brood of young chickens, about sixty yards from my house, and carry one of them off, and in a second attempt a few days afterward, the quasi bird of prey failed to secure its prize. A member of my family witnessed a third instance, on which occasion the prey was carried off.

The fowls in the early part of the season appeared to look for no harm from those birds, but later they came to understand the danger, and uniformly fled to the shelter of the buildings, with cries of alarm upon the approach of crows, in the same way as it is their habit to do from hawks.—JOHN H. BARTHOLF, M. D., *Camp Grant, near Richmond, Va.*

ALBINO DEER AND CHIPMUNK.—Dr. Morgan, at Grand Rapids, Mich., has in his possession the skin and feet of the Common Deer (*Cervus Virginianus*), which was of an uniform pure white, with white eyes and black hoofs. It was observed repeatedly in that vicinity while a fawn accompanied by its dam, which was of the usual color. It was by common consent among the hunters left unmolested, with the intention to await a heavy snow, and then run it down and capture it alive. But the dogs did not coincide in this arrangement, and one day were found chasing it, and as it passed in an exhausted condition near a traveller, he caught it and cut its throat, and skinned it, so that the above trophies were all that could be obtained.

At Centerville, Mich., there is in the possession of a gentleman a com-

mon Chipmunk (*Tamias striatus*), which is of an immaculate white, with a pinkish skin and bright red eyes. There is not a spot or shade of any color except the white, and no trace of any markings whatever. This animal was brought into the house by a cat, but was rescued before any serious injury was inflicted, and it is now kept in a cage, and is a very lively as well as remarkable and interesting pet.—D. DARWIN HUGHES, *Marshall, Mich.*

THE ARGONAUT AND VITALITY OF SNAILS' EGGS.—Mr. John Ford endeavored to show the discrepancies in regard to the mode of generation and growth of the animal of *Argonauta Argo*, citing Madam Power's experiments, and concluding with the query that "if the male argonaut does not produce a shell, why were there no males hatched in Madam Power's aquarium?" Mr. W. L. Mactier exhibited a specimen of *Bulimus hæmastoma*, with the eggs and young shell, and remarked that "the specimens belong to Dr. Samuel Lewis, a member of the section." The shell and eggs were received about three years ago from Barbadoes. A few months ago, on examining his cabinet, the doctor discovered that two of the shells had hatched. It is quite curious to speculate upon the circumstances which have occurred to develop these young shells. The tenacity of life in the mollusca is now well known, but what circumstances operate to retard or favor the development in *private cabinets* we believe is not so well known. Mr. W. M. Gabb followed, speaking of the vitality of the eggs of *Limax Columbianus*, which had hatched after being confined in his cabinet at least three years.—*Proceedings of the Conchological Section of the Academy of Natural Sciences, Philadelphia.*

HONEY BEE KILLED BY SILK-WEED POLLEN.—Enclosed I hand you a honey-bee for examination. I found it lying on the ground, far from any apiary, nearly dead, ceasing to move soon after I picked it up. I found its legs bound together by a great number of those minute yellow disks with their articulate stems, that can be seen by the naked eye. I presume its death was caused by starvation alone, its entanglement causing all its efforts to be directed to freeing itself, but without avail. I presume I pulled off one-half of the disks that were upon it at first, before I thought of saving it for microscopic examination. Mr. Langstroth speaks of bees becoming entangled in the silk-weed blossoms. This may be a case. —ROBERT BICKFORD, *Seneca Falls, N. Y.*

[These bodies are, as you surmise, the packets of pollen of the silk-weed, Asclepias, which adheres by a glutinous substance to wasps and bees frequenting the flowers. They are figured and fully described in the NATURALIST, Vol. I, p. 105, and the "Guide to the Study of Insects," p. 165. We have never before heard of an insect actually loosing its life from this cause, and the case is a very interesting one.—EDS.]

LUMINOUS LARVÆ.—On p. 432 of the NATURALIST, fig. 4, is figured a luminous larva, which is not referred to any genus and species. I suppose it is the larva of one of the species of *Melanactes* (Elateridæ), of which I described two or three, and figured one, in the Proceedings of the Ento-

mological Society of Philadelphia, 1862. Compare especially what I say about the *smaller larva* which I had at that time, and which was found by Mr. Haldeman. Compare also the supplement to my article, confirming the opinion that those larvæ are luminous, and that they belong to *Melanactes*, which short supplement is to be found in the report of the stated meetings of the Society, held April 10, 1865. I thought that this notice might be interesting to you, and draw your attention to those remarkable, large luminous larvæ, which, until very recently, have entirely escaped attention. — R. Osten Sacken, *New York*.

Snails Injurious to the Strawberry. — Herewith I send you some specimens of the *Pupilla fallax* of Say. There is nothing remarkable about the shells themselves, but I wish them to bear testimony to an interesting fact in relation to their habits, which is new to me. Writers on agriculture have studied and written much about insects that are injurious to vegetation, and we have heard of the ravages of the garden snail, *H. splendida* Drap. of Europe; also of the garden slug; but up to this time I do not know that the little mollusks now arraigned have ever been suspected as garden depredators. Mr. and Mrs. Chappellsmith of our town, both students of nature, and intelligent observers, found their strawberry plants dying rapidly, and on searching for the cause discovered these mollusks at work upon the stems and crowns of the plants, rasping off the outer coating, and sucking their juices in such a manner as to cause them to decay. Mr. C. found as many as forty upon one plant, and thinks they have killed several thousands upon the different beds. Though more abundant on the strawberry, he has found them on a variety of plants. Since attention has been called to the depredations of these minute mollusks, they have been found at work upon the strawberry plants in all the gardens examined. For a number of years I have noticed *Helix alternata* Say, in our gardens, and they are becoming more and more abundant; but we have never detected them in doing any mischief. — E. T. Cox, *New Harmony, Ind.*

Ravages of the Alypia Octomaculata. — That a man should desire to raise his own Isabellas is laudable and praiseworthy; and I see no reason why such desire should exist exclusively in the breasts of our bucolic friends. The inhabitants of New York, as a general thing, clearly, are of the same opinion, as is evidenced by the number of grape-vines ornamenting the doors and trellis-work of the houses of our citizens; not, of course, in the benighted regions of Wall street, but up-town; say from Sixteenth street, northward. A friend of mine residing in Thirty-fourth street, showed me, in March last, a very fine vine, which he calculated would produce him sundry pounds of very choice grapes, and in the pride of his heart he invited me to "call along" occasionally, and feast my eyes on the gradual development of the incipient bunches. Thinking that August would be a good month for my visit, I "called along," wondering in my mind whether my friend would, when the time of ripe grapes came, desire me to help myself out of his abundance; or whether he in-

tended to surprise me with a little basket full of nice bunches, garnished with crisp green leaves. The first glance at the grape-vine banished all doubts on this point. There were an abundance of bunches on the vine, in a rather immature condition of course, but of foliage there was not a trace. Of course I expressed my surprise, though, for certain reasons, I felt none; and asked my friend why he selected a species of vine for shelter, ornament, and use, which produced no foliage. He rebuked my ignorance pretty sharply, and told me that a few weeks before the tree was covered with leaves; but, for some inexplicable reason, they had all disappeared — eaten, he guessed, by something. He guessed right. There were at least a hundred of the larva of *A. octomaculata*, the rear guard of a mighty host, wandering about the branches, apparently for the purpose of making sure that no little particle of a leaf was left undevoured. Pretty little things they were, with harmoniously blended colors of black, yellow and blue, but so terribly destructive! I had the curiosity to walk through all the streets to the east of Third avenue, as low as Twenty-Third street, and every vine was in the same predicament. If grape-leaves, instead of fig-leaves, had been in request for making aprons, and our Alypia had been in existence at the time, I doubt if in the whole of the Garden of Eden enough material would have been found to make a garment of decent size. The destruction of the crop for 1868 was complete.

This was bad. But it was not half so bad as the helpless ignorance which possessed nearly all of the unfortunate owners of vines. Scarcely one that I conversed with had the remotest idea of the cause of the disaster, and when I explained that it was the caterpillar of a beautiful little black moth, with eight whitish yellow spots on its wings, which had eaten up the foliage, my assertion was received with such a smile of incredulity, as convinced me that there is no use in trying to humbug such very sharp fellows as are the New York grape growers.

It is a little remarkable, however, that the destruction was confined to the eastern part of the city. I saw several luxuriant vines on the western side; and across the river at Hoboken, and at Hudson City, not a trace of *A. octomaculata* was discernible.

The insect, then, is very local in its habits, and it is a day-flier; and, from these facts, I infer that its ravages may be very materially checked. A little poisoned molasses, exposed in the neighborhood of the vine, would operate on the perfect insect; while a good syringing, with *soft soap* and water, would bring down the caterpillers effectually. I should like some one to try these remedies, and if their gratitude for my good advice should be so exuberant as to require an outlet, why I have no objection to receiving a few bunches of their first ripe grapes, if such a step would afford them any relief. — W. V. Andrews.

The Blue-bird. — I see that Dr. T. W. Brewer, in his article in the Atlantic Almanac for 1868, on the "Song-birds of North America," speaks of the Blue-bird as having made its appearance in Massachusetts once as early as the 15th of February. I have met them once on the Cape earlier

than that. On the 2d of February, 1867, one of the males was twittering about the orchard where we then lived, at East Falmouth, on the shore of Vineyard Sound. A few days after I received a letter from a friend at Sandwich, stating that he saw several of them *during the last week of January*. As he did not give me the day of the month, I cannot give it, but of my date, the 2d of February, I am positive, as I took a note of it at the time. As Sandwich is fifteen miles to the north of East Falmouth, the fact of their being seen there the soonest is quite interesting. In 1866, they appeared March 4th at East Falmouth, and in 1868, not until March 11th. In 1867 we had very severe weather after their early appearance, but they remained. — W. C. Fish.

A Viviparous Echinoderm. — Dr. Edward Grube describes an Echinoid from the Chinese seas, under the name of *Anochanus*, which actually produces young Echini, like itself, having spines, feet, and even pedicellariæ. This discovery is of remarkable interest, for it adds one more to the many diverse methods of reproduction known among Echinoderms, and completes the parallel which they present to the worms. We now know, in both groups, of animals laying eggs which produce embryos developing directly into the adult form; of others which present strange larval conditions which either become completely altered, so as to form the adults, or bud off from their interiors a small mass of living tissue which becomes the adult, leaving the larva to perish. We know, in both groups, of hermaphrodites and of diœcious species, and now we have added a viviparous form of Echinoderm, such as was previously observed in some Nemertian worms. We have yet to discover among the Echinoderms the various modifications of asexual reproduction, by pseudova, fission, or true parthenogenesis; the first two of which methods (especially fission) are so well known among worms. — *Quarterly Journal of Science, London.*

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

National Institute of Science, Letters and Art. On the evening of Dec. 29, 1868, a large number of the members of the National Institute, as well as those interested in the work, met in New York City to organize two of the Academies, *i. e.*, that of the Natural Sciences, and that of the Mathematical and Physical Sciences, into which the Institute is divided. We should mention that after several preliminary meetings, a Constitution was drafted, and on May 29th a copy of it, with the following circular, was sent to the leading scholars of the country:

"The lack of any means of easy intercourse and free communication, and consequently of united effort and mutual support, has been felt for some time past by men of letters, artists, and scientific men in the United States. They constantly find themselves reminded of this lack by their weakness as a class, because although a class

they are not a body with a recognized organization. Scattered over a wide expanse of country, they are, from this dispersion and this want, no less morally than physically isolated. There is no authority other than the temporary and shifting, although in some respects valuable one, of public opinion, by which their claims may be passed upon—no tribunal of their peers or of those of their own class to whose experience and judgment they would willingly defer—no representative council, the stamp of whose approval would be acknowledged by the public as well as by themselves. From the lack of such a centre of union, of communication, and of combined action, they, and with them the cause of truth and knowledge, and the public welfare, suffer. In the hope, therefore, of compassing these objects, we propose to establish a National Institute of Letters, Art and Science, upon a plan outlined in a Constitution accompanying this Circular. We ask your coöperation."

After several meetings a Constitution was finally adopted founded on that of the French Institute, but adapted to the genius of our country. Under this Constitution several Academies have been or will be organized, and their meetings will be held in New York City. The following officers of the Academy of Natural Sciences were elected: For President, JOSEPH LEIDY, M. D.; for Vice President, JOHN S. NEWBERRY, M. D.; for Secretary, CHARLES A. JOY, Ph. D.; for Treasurer, J. CARSON BREVOORT, M. A. For members of the Council, JEFFRIES WYMAN, M. D., and SPENCER F. BAIRD.

If, as it promises to do, the National Institute will bind together and thus efficiently guide and control the army of workers in letters, science and art, a new era has dawned for the development of knowledge and its practical results in America. The National Institute certainly embraces the best talent and learning in the land; it only needs in addition, as has been remarked, an endowment of at least a million of dollars with which to begin its operations. At the outset it should place its officers on salaries, that their time may be devoted entirely to its service; should aid inquirers in making researches; should have the means of publishing its transactions and proceedings on a scale worthy of its liberal organization; and as its local habitation is in the city of New York, to the monied men of that great and wealthy city must it look for the moral and pecuniary support necessary for its life and final success. Such a National Institute in no way conflicts with the American Association for the Advancement of Science, which is a peripatetic body, meeting from place to place in the summer holidays, and we know of no other organization which would so fully meet the wants of the people.

ANSWERS TO CORRESPONDENTS.

J. F. A., Salem.—The presence of plants in sleeping rooms, is a thing to be avoided for several reasons. First, the leaves of growing plants, during the hours of daylight, constantly absorb a large amount of carbonic acid from the air; and this, by the action of the light, is decomposed; and the carbon goes to feed the plant, while the oxygen is exhaled. When light is withdrawn, this process stops, and any carbonic acid remaining undecomposed within the leaf-tissues is liable to escape again; thus to some extent, vitiating the atmosphere. This is not a great matter however, and indeed plants in *leaf only* are not chargeable with much of this kind of mischief. But plants in flower exhale carbonic acid freely at all times; for in all the processes connected with fertilization and fruiting, the starch and sugar found before in the tissues are being taken up and decomposed, part going to furnish the new products deposited in the seed, and part suffering complete reversion to its old form, first into acetic acid, and then into the

original carbonic acid, which is thus plentifully thrown out upon the air, which has at the same time been robbed of a share of oxygen to effect the change. Besides the presence of carbonic acid, flowering plants yield exhalations of many essential oils, and natural odors of various sorts, all of which, in close situations, are liable to cause injury by long breathing, though some may be very pleasant when moderately employed. For these reasons it is understood at present that though plants in *leaf only* may be tolerated in sleeping rooms, yet they had better not be kept there, and no others should be at any time.—C. M. TRACY.

G. W. S., Grand Rapids, Mich.—The only work on American Spiders, is a series of illustrated papers, by N. M. Hentz, in the Journal (Vols. 1–6) and Proceedings (Vol. 11) of the Boston Society of Natural History. The best general works are Blackwall's Spiders of Great Britain, 4to, published by the Ray Society, London, and Histoire Naturelle des Araignées, par E. Simon. 8vo, with 207 figures. Paris, Roret, 1864.

J. W. J., Middleboro, Mass.—Your specimen is the *Botryllus Schlosseri*, a compound tunicate mollusk. It will be described and figured in the new edition of Gould's Invertebrates of Massachusetts.

W. H. D., Troy, N. Y.—Your specimen is the Hair-worm (*Gordius*). See NATURALIST, Vol. I, p. 556.

E. L. G., Decatur, Ill.—See Darby's Botany of the Southern States.

G. W. L., Long Point, Texas.—"I saw a hawk catch an owl the other day. Is it a common thing for hawks to catch owls?" We have not heard of such an instance before. Have any of our readers?

L. B. C., Richmond, Ind.—"I enclose you a strange piece of fungus found here. The piece is oval, and about four inches across the face. When first taken, of a snow whiteness, except at the point of each stalk, where there is a small pink speck. These pink specks have increased more than four times their original size since first taken (eight days). They have also grown darker red all the time. It was found growing point downwards, in the upper part of a cavity in a beach tree, still growing, about four feet from the ground."—It is a young specimen of the *Hydnum erinaceum*.—J. L. R.

W. C. J., Newburyport, Mass.—The specimen found in the stomach of the cod was a Sea-cucumber (*Pentacta frondosa*), which is abundant in ten fathoms, hard bottom, along our whole New England coast.

C. W., Weathersfield, Conn.—The minute insect infesting the pinks in your house, and which spins a thread like a spider, is a Mite (*Acarus*). The little pink mite does considerable damage to roses, spinning webs, and eating holes in the leaves. The best remedy is to apply powdered sulphur with a pair of bellows, for which contrivance several patents have been taken out.

J. A. H. B., Falkirk, N. B.—The works of Professor Baird comprise all you want. Apply to the Smithsonian Institution for "A List of the Birds of North America."

W. C. F., Eastham, Mass.—The bird is the Pine Creeping Warbler, *Dendroica pina*.

W. P. R., Richmond, Va.—The sphinx, which was broken in pieces, is the *Philampelus vitis* of Harris. We would like specimens for our museum.

BOOKS RECEIVED.

List of the Shell-bearing Mollusca of Michigan, especially of Kent and adjoining Counties. By A. O. Currier. Published by the Kent Scientific Institute, Grand Rapids, Mich. 1868. 8vo, pp. 12.

American Bee Journal. January, 1869. Washington, D. C.

Cosmos. November 21; December 12. Paris.

Descriptions of twelve new species of Unionidæ from South America. Notes on some members of the Feldspar Family [with twelve other short articles extracted from the Proceedings of the Academy of Natural Sciences, Philadelphia]. Philadelphia, 1868. 8vo, pp. 32.

Future of Vineland. By Joseph Treat. 12mo, pp. 21. Price 15 cents.

Insect Extinguisher. By Joseph Treat. Vineland N. J. 12mo, pp. 15. Price 12 cts.

Field. November 28, December 5. London.

Land and Water. November 7, 14, 21, 1868. London.

Chemical News. December, 1868. New York.

The Illustrated Annual Register of Rural Affairs for 1869, with one hundred and thirty Engravings. Albany, N. Y. Luther Tucker & Son. Price 30 cents.

Scientific Opinion. November, 1868. London.

Entomologist's Monthly Magazine. May–November, 1868.

Notes on the Later Extinct Floras of North America, with Descriptions of some New Species of Fossil Plants from the Cretaceous and Tertiary Strata. By J. S. Newberry. New York. 8vo, pp. 76.

GLOSSARY.*

Acanthastræa (Gr. *akanthos*, the acanthus, bear's foot; *aster*, a star). A genus of corals.

Ambulacral. Relating to furrows in the echinoderms (sea-urchins, star-fish, etc.), containing pores through which the so-called "feet" are protruded when the animal moves.

Ammonites. A genus of fossil cephalopoda allied to the nautilus.

Andesite. Also called Andesine, differing from oligoclase only in the smaller proportion of silica.

Anodonta. A genus of fresh-water mussels.

Atrypa. A genus of brachiopod shells.

Augitic. Composed of augite or pyroxene; oblique prismatic crystals with cleavage parallel to the faces. Colors from light green to black.

Bacteriums. Excessively low monad-like organisms.

Bromeliaceous plants comprise the Pine-apple and *Tillandsia*, or "Long Moss" of the South.

Caducous. Dropping off; ready to fall.

Cassis (Lat., a helmet). The Helmet-shell.

Cecidomyia (Gr. *kekis*, vapor; *muzo*, to suck). A genus of dipterous gall-flies.

Cedreala odorata. The "West Indian Cedar;" not however a true cedar.

Clypeus. A part assisting to form the front of an insect's head, situated below the antennæ, and bounded in front by the *labrum*, or upper lip.

Cæcum, pl. *cæca.* In fishes and the lower animals blind sacs opening into the intestine.

Columbella. Lat. diminutive of *columba*, a dove. A genus of shells.

Corallum. In corals, the polyp-stock, *i. e.* the whole colony of coral animals.

Corticifera (Lat. *cortex*, bark; *ferens*, bearing). A genus of corals.

Costæ (Lat. ribs, ridges). In shells the ridges encircling the whorls. (The ridges running parallel with the suture are not usually called costæ.)

Cyperaceæ † (Lat. *cyperus*). The Sedge family.

Dimerous. Made up of two parts, or its organs in twos.

Dinosaurian. Relating to an order of extinct gigantic lizards.

Doleryte. An igneous rock of the augitic series "composed of labradorite and augite, often with magnetic iron."

Draba. The Whitlow-grass, a genus of the Mustard family.

Echinaster (Gr. *echinos*, sea-urchin; *aster*, star). A genus of star-fish.

Echinometra (Gr. *echinos*; *metra*, a matrix) A genus of echini.

Echinorhynchus (Gr. *echinos*; *rhugchos*, a proboscis). A genus of entozoa or intestinal worms.

Elasmognathus. A genus of tapirs.

Exindusioid. Not having an *indusium* (Lat. shirt). The involucre or covering of the thecæ (spore-cases) of ferns.

Favia (Lat. *favus*). A genus of corals.

Fission. Generation by self division, as seen in many infusorial animals and plants.

Gorgonia (pl. æ, Lat. mythological name). A genus of corals.

Graptolites. A group of fossil animals, generally supposed to be mollusks of the bryozoan type.

Habenaria. The Rein-orchis.

Halcyonoid. Like halcyonium; a genus of polyps.

Heliastræa (Gr. *helios*, sun; *aster*, star). A genus of corals.

Heterogeny. The doctrine of spontaneous generation.

Inoceramus (Gr. *is*, fiber; *keramos*, shell). A genus of fossil shells somewhat like an oyster.

Inoperculate. Without an operculum.

Labellum. The odd petal in the orchis family.

Lespedeza. The Bush-clover; a genus of the Pulse family.

Leucitophyr. A volcanic rock of the basaltic series, consisting of augite and leucite.

Ligulate. Strap-shaped.

Liparite. Used by Richtofen to designate porphyritic rhyolite.

Lithobius. A genus of centipedes.

Lithoidic. Meaning stone-like.

Lithological. Relating to lithology; the study of the mineralogical and chemical composition of rocks.

Megaptera (Gr. *megas*, great; *pteron*, wing). A genus of whales, to which the "Humpbacked" whale belongs.

Millepora (Lat. *mille*, thousand; *porus*, pore, hole). A genus of corals.

Monads. A genus of excessively minute protozoa, or animalcules, of jelly-like consistency.

* No terms are explained here which can be found in the Glossary of Vol. I.
† The derivations and meaning of botanical names are fully given in Gray's Manual of Botany.

Monotropa. The Indian Pipe, Pine-sap; a genus of the Heath family.
Mussa. A genus of corals.

Nevadite. Granitic rhyolite.

Ocellus. The simple eye, supplementary to the large compound eyes of insects.
Oligoclase. A lime and soda feldspar, very like albite in appearance.
Ophiura (Gr. *ophis*, a snake; *oura*, tail). The Snake-star, Sand-star; a genus of echinoderms.
Oreaster. A genus of star-fish.
Orobanchaceæ. The Broom-rape family.

Parthenogenesis. Reproduction without the interposition of the male, as in the summer broods of plant-lice (Aphis).
Pedicellariæ. Little bodies like birds' bills, on star-fish and sea-urchins.
Perianth. The leaves of the flower generally, especially when we cannot readily distinguish them into calyx and corolla.
Petrogenetic. Means, literally, born of a stone.
Pinnate. With leaves divided like a feather.
Porites (Lat. *porus*, pore). A genus of corals.
Propylite. Third order of volcanic rocks, according to Richtofen.
Prothorax. The first or front ring of the thorax in insects. The *mesothorax* is the middle, and the *metathorax* is the third or hinder ring. The *peduncle* connects the thorax and abdomen.
Protichnites. Footprints of ancient extinct animals, supposed to be allied to the horse shoe crab.
Pseudova. Unimpregnated eggs which produce young, as in those laid by virgin Aphides.
Pteridologists. Students of ferns.
Pterodactyle. A genus of winged reptiles resembling bats.
Pulmonates. Land snails.

Revolute. Rolled backwards.
Rhyolite. First order of volcanic rocks in Richtofen's system, defined by him as trachyte, with the addition of silica.

Sacral. Relating to the sacrum (the subterminal bones of the vertebral column, forming part of the hinder wall of the pelvis).
Sessile. Not stalked, pedicelled or peduculated.
Siderastræa (Lat. *sidereus*, relating to a star; *aster*). A genus of corals.
Squalodon. A genus of sharks.
Sporangia. Spore-cases.
Strontian. A mineral first found at Strontian, Scotland.
Struthious. Relating to the ostrich, Struthio.

Talus. The collection of pieces of rock and dirt which accumulates at the foot of a cliff or bank.
Tapiridæ. The family of tapirs.
Thallus (Gr. *thallos*, a frond). The vegetative system of lichens, combining root, stem, and leaves in one organ.
Tibiæ. The shank-bone. In insects the fourth joint of the leg, placed next to the *tarsus*, or toe-joints.
Trabicular (L. *trabs*, *trabis*, a beam). Relating to the structure of a polyp cell.
Trachyte. A volcanic rock composed of glassy feldspar, hornblende, and perhaps a little quartz and mica; usually porous.

Zygodactyles. The Woodpeckers.

ABBREVIATIONS. — *Lep.*, Lepeletier de St. Fargeau. *L.*, Linnæus. *Sauss.*, Saussure. *Somm.*, Sommer.

CORRECTIONS TO GLOSSARY FOR VOL. I. — After *Calypso*, add: A genus of the orchid family. *Cycads* are plants with somewhat the aspect of palms or tree-ferns, but in no way related to them. They belong to the same group with the pine and other conifers. *Dimorphism.* Add, "after animal" or plant. *Nephroma* is a genus of lichens. On p. 524, for 224 read 524, and on p. 688 at bottom, for 224 read 524.

ERRATA TO VOL. II. — Page 97, 14th line from top, for 78,000, read 87,000. Page 60, line 9, for *middle branches*, read *thick branches*. Page 61, line 6, for *submerged*, read *submarginal*. Page 71, line 9, for *Pariaba*, read *Paraiba*. Page 166, line 24, for *Cretacean*, read *Cetacean*. Page 111, line 33, for *lines*, read *times*. Page 233, line 8, for *virulsari*, read *virularis*. Page 233, line 11, for *Elegans*, read *elegans*. Page 235, line 22, for *plumra*, read *plumosa*. Page 235, line 26, for *Callithaminons*, read *Callithamnions*. Page 331, line 35, for *their*, read *its*. Page 334, line 2, for *one*, read *our*; line 7, for *are*, read *is*. Page 165, the *Otiorhynchus sulcatus* is figured by mistake instead of *Hylobius pales*. Page 220, line 22, for *Gelechia*, read *Penthina*. Page 450, line 6, for *and* of the fire-hearths, read *or*, etc. Page 454, in explanation of Fig. 8, for *natural* size, read *half-natural* size. Page 455, line 7, for *Mr.*, read *Dr.*; line 28, after namely, *dele* comma. Page 461, line 8, for *on top*, read *on the top*. Page 462, line 20, for *longer*, read *larger*.

INDEX TO VOLUME TWO.